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ABSTRACT

The paradigm and model presented in this paper, influenced by the Havelock's "linkage" model and Chin's "changing" model, aim to assist educators in determing directions of change using a selection of managerial and behavioral techniques, and to regulate the rate of change using management information and control systems. The generic paradigm includes components of change such as: community invclvement, "temporary" systems, force-field analysis, forcing function, professional education, and computer-managed and client-assisted change. A proposal for a change agency is presented which incorporates a change agent, demonstration programs in schools, and a computer data file to assist in identifying and selecting alternatives. (Author/RH)

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TOWARD A PARADIGM OF EDUCATIONAL CHANGE: THE ROLE OF MANAGEMENT INFORMATION SYSTEMS

by

Richard Shelton Simonds

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This dissertation, written by

Richard Shelton Simonds

under the direction of his Dissertation Committee, and approved by all its members, has been presented to and accepted by The Graduate School, in partial fulfillment of requirements of the degree of

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Charles G. Mayo
Dean

Date September 20, 1972

DISSERTATION COMMITTEE

Chairman

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1973

- God grant me the courage to change
the things I can, the serenity to accept the
things I can't change, and the wisdom to
know the difference -

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Dr. Leo Persselin assigned a project to compare the historical events of the past 200 years with identifiable "forcing functions" and I became increasingly aware of the importance of the concept in educational change.

Dr. William H. Allen and Dr. Herbert R. Miller provided one of the most stimulating seminars I have ever

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And, finally, I am reminded that insanity is hereditary: parents get it from their children.

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CHAPTER I

THE PROBLEM

Introduction

That change is inevitable seems to have eluded our social functions more than our technological ones. It is evident that scientific/technological strides have vastly changed our way of life. Yet the social adjustments to such changes have not easily kept pace. This concept of "cultural lag" is a basic one in the literature of sociology. And, it is nowhere more evident than in the schools. What homemaker would maintain a house with the tools and techniques of twenty or thirty years ago? Very few. But, it is not only possible, but probable, to find schools operating as they did twenty, thirty, or even forty years ago. Both the structure and the function of education need to be examined in the light of our newest research on learning, teaching, management, and human relations.

The question arises as to how we (educators, citizens, and students) can create the climate which

enhances the change of the educational environment. We need to change not for the sake of change, but to improve education in terms of our goals, objectives, aspirations, needs, and resources.

There are strategies to accomplish the necessary goals development, needs assessment, and management techniques if we will but use them. There is a significant body of research on dissemination, diffusion, adoption, and implementation of educational ideas if it were only brought together into a comprehensive model which could be applied to the process of change.

It is the purpose of this research to study these components of the change process and to assemble a multidisciplinary model of change using methodology from the system approach--analysis and synthesis. The ultimate objective of such a model is to act as a basis from which other researchers may study change, and to provide the impetus for the development of a "linking agency" which will serve to aid local educational agencies in the facilitation of improving the educational organization.

Statement of the Problem

This portion of Chapter I will be divided into several parts. Because of the multi-disciplinary nature of the change process it seemed necessary to consider the problem situation from a variety of perspectives. Each of the components closely relates to the other, and in a number of cases it was difficult to make clear cut distinctions as to which category a concept would fit. The sequence and scope of these categories is thus only intended to indicate the nature of the change process.

Background--Historical, Philosophical

"The history of education abounds with accounts of educational reformers seeking to effect changes in education" (Lawler, 1970, p. 2). Socrates was the classic example of one who reformed so effectively that he was accused of subverting the youth of Athens--and as educators point out his accusers found a permanent solution to their temporary problem. Certainly the influence of educational reformers such as Plato, Aristotle, St. Thomas Aquinas, Pestalozzi, Rousseau, Comenius, Lancaster, Montessori, and John Dewey is seen in education today. They all had an influence in their day, and have one now. Their

effectiveness, in part, must be because " . . . the strategy of these reformers was one of demonstration, as well as development, of their ideas through practice" (Lawler, 1970, p. 2).

Yet, there have been great periods of time in which change was inhibited. Donald W. Robinson (1972, p. 587) notes that the Middle Ages was a period of time characterized by the absence of change and is virtually synonymous with the Dark Ages. Toffler, commenting on our modern society states, " . . . our schools face backward toward a dying system, rather than forward to the emerging new society" (1970, p. 399). Others--not quite so pessimistic say that schools not only must change, they will (Goodlad, 1968, p. 30). He further notes that the changes must occur in both the functions of the teachers and the structures of the schools.

The crisis occurs when these two views come to a disjuncture. For "change must and will occur" does not fare well with "we are looking backward." One of the distinct problems in change is that it has been tolerable to have changes cover the entire lifetime of one person--this is no longer reasonable. Paul Armer observes, " . . . institutional adaptation is very much geared to the life

span of man--the old guard frequently stays on until retirement--especially in our public institutions" (1970, p. 82). He looks to technology as a way of coping with this anomaly between needs and habits. And, as Gardner so succinctly observes, technology is more than a way of doing things differently, it is often a new way of thinking (1963, p. 30). The way of thinking is renewal, according to Gardner, and he outlines a basis for meeting the need. In essence, he says we must innovate, change, and ". . . bring the results of the change in line with our purposes" (1963, p. 6). Richland states that traditional education won't do; innovation is required (1965, p. 6). In other words we need goals to determine where we want to go and technology to help us get there, and apparently we must find innovative ways of determining how to harness what we know.

"We appear to have no sense of priorities where our problems are concerned . . . " comments Stafford Beer (1970, p. 43). This concern of determining goals and direction and allocating priorities has faced all of our institutions in various ways. And, certainly there is no one answer to the problems which arise in determining priorities. The supposed purpose of a democratic system is to enhance the possibility of consensual determination. The challenge is

to make it functional.

John Goodlad brings to the forefront the concern for values in determining our priorities, and suggests a number of concerns we should have regarding the direction and purpose of education (1968, pp. 22-32). The Committee for Economic Development has prepared a Statement on National Policy in which they recommend four imperatives for the schools (1968). The imperatives which they see are: innovation and change; basic and applied research and the dissemination of the findings; cost-benefit and cost-effectiveness studies and distinguishing among programs of high and low priority; and, establishment of a Commission on Research, Innovation, and Evaluation in Education (1968, p. 13).

The obvious point is that change is required, and innovative answers are needed. "Change is inevitable; the question educators must face is whether we will help to shape it as participants or whether we will be swept along with it as spectators" (Kaufman, 1970, p. 123). Certainly the goal of the Elementary and Secondary Education Act of 1965 and many other acts of federal legislation have intended that an innovative approach will help us to change in the desired directions and the necessary amount. Though,

in the National Conference on Diffusion of Educational Ideas, E. Rogers and N. Jain stated, " . . . this is a time of great innovation but very little change in education" (1968, p. 93).

The federal government programs have not effected the kinds of change needed in either the structure or function of American schools. Nolan Estes (1967) and Blaschke (1971) have noted the failures of the federal programs to encourage innovation. Estes states that the Title I program of ESEA was reactive rather than a forward thrust, that they were intended to be compensatory (an antidote for past failure to plan). We must begin " . . . anticipating alternative futures and making wise decisions concerning the allocation of resources--human and financial . . . " (1967, pp. 1-2).

Thus far it would appear that change efforts in American education have been a reaction to crisis rather than a planned, goal-oriented, purposeful attempt to move toward where we want to be. This trend in American values seems to indicate that we change away from aversive elements (such as voting against a candidate or an issue) instead of toward desirable outcomes. Undoubtedly this course of action could continue, but one must ask what it means in

terms of the quality of life.

John R. Platt has despairingly observed:

> The trouble is that we may not survive these next few years. The human race today is like a rocket on a launching pad. We have been building up to this moment of take-off for a long time, and if we can get safely through the take-off period, we may fly on a new and exciting course for a long time to come. But at this moment, as the powerful new engines are fired, their thrust and roar shakes and stresses every part of the ship and may cause the whole thing to blow up before we can steer it on its way. Our problem today is to harness and direct these tremendous new forces through this dangerous transition period to the new world instead of to destruction. But unless we can do this, the rapidly increasing strains and crises of the next decade may kill us all. They will make the last 20 years look like a peaceful interlude. (1970, p. 161)

If he and Toffler are correct, along with the number of Malthusian ecologists who predict our demise, then there is no purpose in attempting to look to the future. Actually Platt makes the point himself that " . . . the present generation is the hinge of history. We see that if we can survive for the next twenty or thirty years, we can move into a high-technology world society . . . " (1970, p. 129). One characteristic of man is that he is a goal seeking animal, and is the only animal who can choose what kind of life he will live; it seems likely that given the chance he will choose among plausible alternatives. As will be noted later, the information overload is one of the

crises preventing this opportunity for choice. It was T. S. Eliot who asked, "Where is the life we have lost in living? Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?" And, I might add, where is the information we have lost in data?

Without bemoaning our fate, it is a time for action. Commissioner Marland, in his 1970 Report to Congress, said, " . . . big as this Nation is, it is ready for change" (1971, p. 6). He recommended that our bi-centennial (1976) celebration might be a good time to measure our progress. The beginnings of national assessment have already been set into motion (Marland, 1971, p. 25).

Assessment

From the comments made earlier (Gardner, Toffler) it should be evident that there is a considerable concern with excellence in education; which can only be achieved by knowing where we want to go. In this regard Woodbury observed, "Excellence in education requires a rational basis for change. The first step in change is an assessment of needs" (1970, p. 14). Launor F. Carter criticized a common fallacy made in our approaches to problem-solving when he stated:

> It is surprising how frequently we resist the idea of assessment. We will deplore some existing condition or state that a serious problem exists without being willing to undertake the necessary effort or even to recognize the necessity for a quantitative assessment of the existing situation. (1968, pp. 16-17)

It is not uncommon that we " . . . typically prescribe before . . . [we] . . . diagnose" (English, 1971, p. 2). Because we seek solutions to our problems so rapidly, we often fail to find out what it is we are solving. As one wag once said, "Technology is the answer, now what was the question?" Being accountable for outcomes is not conducive to such an approach.

Daniel Landis, and others, noted that the large expenditures in American education have lead to the demand for accountability. Faced with the need to evaluate outcomes it was necessary to determine goals, inputs, cost factors, and many other variables. His observation was that the systems approach was chosen for several reasons, ". . . not the least of which was that it was being pushed by the Federal funding agencies" (1970, p. 1). He went on to observe "the key attribute of such a system would seem to be the introduction of an integrated set of man/machine programs which can actively monitor relationships among the three factors . . . input . . . process . . . output . . . " (1970, p. 5).

The System Approach, Models, and Alternative Futures

The system(s) approach to organization involves both analysis and synthesis of a structure. Analysis is the breakdown of the components into manageable size for study; synthesis is the reassembly into a more cohesive, and hopefully functional whole. The success of system analysis in industry has led some to believe that it can provide the panacea for educational problems.

> Systems analysis will not cure all the real and presumed ills of education. It will not alone eliminate a single evil or replace one traditionally trained administrator. Moreover, such benefits as may be derived from a systems approach will occur gradually as educators adapt some new attitudes and adopt a few new tools. Educators are well advised to view the sometimes brash systems analyst who peers in on his business as a potential ally. . . . The resulting association will certainly create an understanding and hopefully a partnership beneficial to both parties and ultimately to the education of those teaching and being taught in our educational systems. (Meals, 1967, p. 203)

One of the products of system analysis/synthesis is the development of a flow diagram or chart known most often as a model of the system. A model can help to make a complex organization easier to understand by showing, graphically, the relationships among the several parts. It can provide a method for looking at the process (flow) of an organization's constituencies. But, it also has the

potential flaw that it may be mistaken for the reality of function. And, this is not the case as Havelock notes. Current models "do not adequately account for the critical events, the crises and the revolutions which play such an important role in social change from an historical perspective" (1969, p. 11-19).[1]

In addition to the models which Havelock reviewed up to 1969, others have been studied by this researcher with the same conclusion. Each of the existing models seems to focus on a particular concern without taking the holistic view of the change process which is proffered by the system approach. In essence, there still exists a need for a generic model of educational change. Havelock (1969, p. 10-76) found the same need; a generic, valid, model should be assembled as most researchers are using similar methods to study the change process.

Although it is common in systems technology to view models as offering a chance to predict system processes and outputs (particularly with algorithmic programs), Toffler quotes Christoph Bertram of the Institute for Strategic

---

[1]All citations from Havelock, 1969, will be by a hyphenated entry (e.g., p. 11-19 is Chapter 11, p. 19, which is the form used throughout his work).

Studies in London that their purpose is "not so much to predict the future, but, by examining alternative futures, to show the choices open" (1970, p. 465).

Having the opportunity to consider alternative futures inherently states the possibility of having to choose from among the alternatives. Again, a rational choice cannot be made if there are no goals or long-range plans to guide. David L. Jesser comments on the failure of educators to utilize long-range planning with the observation that, "one fundamental explanation should be mentioned, however: Until recently few educators understood--and were aware of the need for--such planning" (1969, p. 32).

Hence, with long-range planning, an organization may select desirable alternatives to contingencies which are part and parcel of historical development. Certainly well thought out decisions are not easily made if one is not even aware of the alternatives. The adage, "fore-warned is fore-armed" would seem appropriate. Gardner makes a point that " . . . freedom is the existence of alternatives or choices" (1963, p. 67).

Having choices implies the need to choose, and to having the capability to manage the choice once it is made. Donald R. Miller stated, "to be effective in a rapidly

changing societal and environmental context, educational systems . . . must realize the need for continuous renewal and develop adaptive mechanisms which facilitate the systematic planning and management of change" (1970, p. 2). School systems have for too long operated as if they were closed systems within a changing society. That this is true is illustrated by the "ivory tower" concept. The need to adapt to differing societal concerns requires an open, dynamic system.

Management Information Systems, Decision-making

> There was a time in our country when a teacher was able to keep all the information he needed to do his job in a small desk drawer, a "class-book," and his memory; a time when a school superintendent required no more than a ledger and some cards to do a "good" job of administration; a time when the college president knew each student and staff member personally as well as their immediate families. (Haga, 1967, p. 10)

This condition no longer exists in urban and sub-urban school districts; it may be possible to operate in such a way in small, isolated rural districts. Even in small, isolated districts, however, there is a need for knowing alternatives and managing resources judiciously. There is still a basic soundness to making intelligent decisions.

Policy makers (decision makers) need facts to make intelligent decisions. "Immediate social problems call for immediate solutions and policy makers will act with or without facts" (Havelock, 1969, p. 8-10). Several researchers have identified the problem of "raw data" having little or no meaning to decision makers, and have observed that it must be organized and selected to be meaningful. The best research is but raw data in local hands. Decision makers have more information than they can handle (Bundy, 1970, p. 1; Beer, 1970, p. 45; Sherman, Wanger & Ruhl, 1970, p. 21). Chorness and others, have said:

> . . . there is no reason why planners and decision-makers should be forced to rely upon their prior experiences and intuitions alone when the hard experience of others in similar project areas may have been documented and would be at their disposal if only they knew they existed. (1969, p. 17)

Because the development of information systems is fairly recent it is easy to understand that administrators have relied upon prior experience and intuition <u>alone</u> in the past. Brickell's findings are more disconcerting:

> In the United States even today, research findings do not compete well against such established, persuasive information sources as one's personal experience or knowledge of what other schools are doing. . . . The prospective adopter is not likely to select the research-based solution solely because it stands on a base of scientific knowledge, especially if something

> else is less expensive, easier to install, preferred by the faculty, or otherwise attractive. (Brickell, 1967, p. 235)
>
> Because of the unique nature of his intelligence, man is inclined to place all the phenomena he perceives into patterns of meaningful interrelationships. He organizes the world around him into cause-effect relationships which appear rational to him. In many instances he does this without taking into consideration all the data which are known or available to know. Hence, he sometimes assigns relationships between and among phenomena in the universe which are not verifiable when tested empirically by others. (Bohlen, 1968, pp. 3-4)

Thus, man will not use research findings even if they are available, and he categorizes and acts on his information even though it cannot be upheld empirically. Such information is not new, nor is it surprising. It does serve to point up the need for a man-machine approach to intelligent decision-making; an approach which utilizes the complementarity of man-machine symbiosis.

Robert B. Miller comments that humans are limited and selective in their memories (1967, p. 311), and goes on to itemize the characteristics of human mental processes as related to the ultimate objective--to enhance the strength of decision-making. Miller postulates, that the "Human is not a rigorous inference-maker--although he may arrive at rigorous inferences through a series of heuristic operations" (p. 311), "detail memory tends to be poor," "response

to context is good," "conceptualizing patterns of relationships is comparatively good," "remembering facts . . . tends to be selective and biased," "computation and logical operations are notably poor," "categorization of ideas is generally imprecise," "channel capacity of the human is fair to poor," "language reprogramming . . . fair to good," "response to visual displays of relational data is very good," "thinking--goal-directed implicit activity-- . . . generally requires warm-up" (pp. 311-319).

On the basis of the characteristics stated, it would be possible to design a man-machine system which would enhance the strengths of man and provide for his weaknesses.

Management information systems (man-machine systems) can be seen as a powerful adjunct to decision-making. Watson has commented:

> To expect board members and school administrators to make rational decisions about resource allocation in the absence of the most elementary data is an exercise in futility. To make such data available, a management information center is a basic need. (1971, pp. 349-350)

Certainly increased sophistication in the processes of decision-making will increase the quality of the decisions (at least in terms of criterion-referenced measures)

and hopefully in terms of value in terms of future tasks. Miles (1964) has noted that without increased sophistication in the management of change we are indeed headed for difficult times (p. 486).

Toffler says that "future shock . . . arises from an overload of the human organism's physical adaptive systems and its decision-making processes" (1970, p. 326). He goes on to say that future shock does not imply a need to stop change [as some would imply] but it is the need to manage change; man may need the assistance of technological aids to increase his adaptivity (p. 373). To manage change we need to anticipate it, and we can assign probabilities to some of the changes which we envision (p. 379). Finally, we may use a technique called Cross-Impact Matrix Analysis to trace the compound effects of innovation(s) through anticipation of consequences (p. 462).

The possibilities of comprehensive analysis of change upon the school system and the larger society, as well as the selection of alternatives bodes well for the potential of a major information systems network. Alkin and Bruno, in a discussion of the applications of systems approaches, stated:

> . . . ultimately the most valuable application of systems techniques to education will be their use in selecting among alternative processes for achieving specified educational objectives. (1970, p. 233)

They go on,

> A major function of educational administrators is to make decision . . . the making of educational decisions that involves choices among costly alternatives, requires more than intuitive judgment. Procedures and techniques need to be employed that permit a more precise evaluation of the consequences of alternatives before decisions are made, so that the ultimate decisions will be sound. (p. 191)

In 1968, the Far West Regional Laboratory published a monograph in which Robert Coney pleased that the improvement of American education was dependent upon an awareness of and information about alternatives (Coney, 1968, p. 4).

Purposive, meaningful, criterion-referenced, and objective-oriented change will occur only when educators realize the need for and provide the means to compare alternative plans and make decisions on them using some expectations of future conditions. On the basis of experience using information systems in several sectors of the business and industry field, it is the contention of this writer that it should be possible to develop broad-based information systems for education. Such systems were developed in the business and industry area because of pressure from the federal government to maintain tighter

controls on cost-effectiveness, long-range planning, and the corresponding critical decision processes which were required. The Planning, Programing, and Budgeting System is expected to be found in use by all federally funded agencies. David W. Ewing tersely stated:

> However, with the pressures on improving the efficiency and effectiveness of school systems across the country (similar to pressures on the Defense Department in the mid-50's) one can only surmise a drastic change will occur. (1970, p. 229)

John Evans identifies the need for a nationwide management information system: "Lacking an effective nationwide data base, many applications of MIS tools . . . are difficult or impossible to achieve" (1970, p. 300).

There seems to be a trend in the comments to this point--it is necessary to have a crisis, malfunction, or similar attention-getting situation in order to effect innovative changes. This concept was made clear by Leo Persselin of the University of Southern California, when he discussed the "forcing function" of change processes. Force does not necessarily have to be external pressure on the system--although it often is--but force is an acknowledgment of a condition which needs attention.

Forcing Function, Crisis

Typically when a crisis occurs, man adapts to it as best he can and attempts to make the outcome a "change for the better." That crises are used expeditiously by change agents to implement desired changes permeates the literature. Gardner comments that when we talk of revitalizing a society there is usually no lack of ideas, even though that is where our emphasis is placed, rather the problem is "to get a hearing for them" (1963, p. 43). And in a similar vein, Bennis, Benne, and Chin note "that man tends to fear change more than disaster" (1969, p. 148). Perhaps the fear of failure is less during a crisis, for at that time the situation is so bad that anything the decision-maker does will probably improve conditions; whereas in "normal" conditions any change may lead to criticism that the new circumstances are less satisfactory than "the good old days."

> The image of innovation as the shatterer of a serene status quo is particularly inappropriate in the modern world. . . . Today even the most potent innovator is unlikely to be effective unless his work coincides with a crisis or series of crises which puts people in a mood to accept innovation. (Gardner, 1963, pp. 28-29)

The application of this need for a forcing function is seen in Commissioner Marland's observation that taxpayers

approved less than half the amount of bonds requested, the result of which is, "many school districts teetered on the brink of bankruptcy" (Marland, 1971, p. 10). If it is true that the major purpose of an organization or organism is survival, then there is no stronger forcing function than bankruptcy to create the awareness of the need for change. Yet, it may not be as effective as it needs to be, as Marland goes on to quote a National Education Association report that the "bureaucracy of most big-city systems is impervious to the demands of parents and can be influenced only with difficulty" (1971, p. 11). Because of a near obsession with the status quo in programs most organizations see innovations as being <u>added on</u> to their existing program, instead of as a replacement for it. And, as Miles points out, when a system sees innovation as requiring <u>extra</u> system effort there is little chance of it being tried (1964, p. 646). To overcome this need for force by the taxpayers, Kaufman states that "perhaps the taxpaying public would be more inclined to pay for <u>planned</u> measurable change" (1970, p. 174).

There is more to this suggestion than that a system approach be utilized to effect systematic changes. The idea of forcing function is intimately related to Kurt

Lewin's force-field analysis. In that approach and the approach of Carl Rogers there is an attempt to determine the constraining and changing force fields, and of finding ways to create a change in the balance of the forces. To effect change it is necessary to reduce the constraining forces or increases the forces for change. The outcome of such studies has been an increasing awareness of the benefits of a broad participant base in planning and decision making in the setting of goals.

Local Involvement in Change Processes

The community, students, teachers, union members, and any other members of influence need to be considered and involved in effecting changes--whether these are in schools or in any other institution. Kimbrough notes that the community power system needs to be used to promote educational change: he considers several strategies to effect such change, and illustrates past strategies which have failed (1970, pp.72, 76-77). Toffler observes that in politics, in industry, and in education, "goals set without the participation of those affected will be increasingly hard to execute" (1970, p. 477). And, Matthew Miles writing about change indicates "what seems at work in

the community is a cumulative sense of alienation and impotence, and a feeling that the schools represent the last island of direct citizen participation and control" (1967, p. 21). When innovations fail it may be because the community members feel that they can, at least, influence schools when their sense of despair about other political organizations has reached its worst state.

The need is so obvious as to be ridiculous. Involve the community in school goal setting and tap a wealth of latent need to have some voice in community affairs. For the schools across the nation are proud of the structure which gives them "local control." Of all the innovations which educators might consider, the involvement of all persons in educational planning who are affected by the plans might be the greatest innovation of all (Michael, 1967, pp. 278-279). And, finally, it has been noted that in order to effect changes in knowledge utilization it may be necessary to introduce new attitudes before introducing new practices (Havelock, 1969, pp. 8-30 & 8-31).

Inhibitors to Change

There is more than changing attitudes in accomplishing the adoption and implementation of new practices.

Several researchers have itemized the kinds of resistance to change and inhibitors to change which must be considered. Bandy (1969) has noted that school structures do not facilitate change. Teacher repression of colleagues, external pressure and internal response, administration is too precarious to recommend changes in their own practices, and school people tend to overestimate the resistance by locals to change, are all concerns affecting change rates (pp. 3-4). Havelock has identified role perceptions of administrators and administrative structures inhibit change (1969, pp. 2-17 & 2-18). John Goodlad flatly said, "It would seem that a substantial part of whatever thrust there has been in recent efforts to change schools has been blunted on the classroom door" (1971, p. 158). He goes on to list eight factors which affect change and the need for change in schools (p. 159). He mentions the gap between what is and what could be, the number of educators who want to know more about the newer ideas and concepts and how to implement them, the problem that we leave the education of personnel to a process of osmosis, there are few models of what redesigned schools would look like, the norms and expectancies for schooling are discouraging if not frightening, upward mobility for teachers is limited, <u>significant</u>

educational change can only be the result of a comprehensive attack on the whole, and we are not at all clear about how to go about such an attack (Emphasis mine). Havelock (1969, p. 6-6) notes that survival, stability, purpose, and membership inhibit change in education.

> Low interdependence. Generally speaking it seems accurate to say that the different parts of school systems do not lock together as closely and sensitively as those, for example, of an industrial firm. . . . It is important to note that a low degree of interdependence ordinarily makes a system much more difficult to alter, since if changes occur in one part (e.g., in one teacher's practices), there are no meaningful channels or linkages by which they can travel to other parts of the system. (Miles, 1964a, p. 12)

The statement by Miles certainly illustrates the need for broad based participation mentioned earlier. Other factors inhibiting change in public schools have been identified by Carlson as the absence of a change agent, a weak knowledge base, and the "domestication" of the public schools (1964, pp. 4-6).

In his monumental Innovation in Education, Miles describes other factors which inhibit change: there are four distinct stability-maintaining forces--current operations requires maximum energy, hierarchically arranged subsystems become progressively segmented and isolated, durable feedback loops develop which tend to restrict open

communications, and the system does not define the operations of other systems as any better than their own (1964, p. 644). Further he notes that permanent systems find change difficult, and suggests that temporary systems may enhance the ability of permanent systems to change (pp. 443-444). And he concludes that diffusion rates in education are slower than in other fields due to "the absence of valid scientific research findings; the lack of change agents to promote new educational ideas; and the lack of economic incentive to adopt innovations" (p. 634).

It is just such comprehensive reviews of the condition of education that the need for a generic model of education was felt to be applicable. The federal government intervened in the affairs of business and industry in the late 1950's and in its own internal operations throughout the 1960's to the present in an attempt to increase the effectiveness and efficiency of operations. It would appear that many of the agencies of the government were similar to the condition described by Miles when he noted the low interdependence of public schools (internally). Hence, it would seem that change is possible in bureaucratic organizations if there were but a way to accomplish it.

Change Strategies, Planning

Innovations, improved school practices, changes of any kind require some procedure whereby they will be effectively introduced and maintained (if satisfactory) or eliminated (if undesirable ultimately), Yet such strategies seem to be notably lacking in American education as a whole. There are certainly some fine examples of schools which adapt to the climate of needs which surround them, but unfortunately they are the exceptions. What must be found is a way to assist all of education to provide for the basic needs of the overall society and the local community in the best balance possible. Such a hope implies that goals will be set, alternatives will be looked at, and decisions will be made which will necessitate some form of planning (both of content and of strategies of the change).

"Intelligent cooperation with the inevitable is one way to define planning. . . . change will come to all institutions whether it [sic] is prepared for it or not" (Knezevich, 1969, p. 1). Although fatalistic, there is something delightfully honest about this definition, for change does occur, there are vectors which indicate the direction of social change, and planning is one way of coping/adapting/modifying to meet the alterations sensibly.

Planning is deciding to affect the process rather than to stand by and have to react to or compensate for conditions which were not considered earlier in the process. Planning is identifying strategies for change.

Unfortunately planning and strategies have focused upon the content or characteristics of innovations to the exclusion or slighting of the means of accomplishing them (Miles, 1964; Richland, 1965). Miles also discusses the need for studying the process of implementation and the characteristics of strategies (pp. 647-649). He notes that strategies are policies overriding the "tactics" which are specific steps. Occasionally strategies are confused with tactics, but they are unique and separate components of the overall design to effect change.

The SPEEDIER PROJECT in Pennsylvania commented on the need for strategies in their Third Annual Report, "For many years educational systems have operated without specific pre-planned strategies for change. . . . It seems important then to develop some planned strategies" (1970, loc. III, E-10).[2]

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[2](ERIC microfiche, #ED 040 910, Fiche III, coordinates E-10).

Richard E. Schutz of the Southwest Regional Laboratory for Educational Research and Development, and Launor F. Carter of System Development Corporation have indicated that ways of effecting change and the strategies of educational improvement are our most important priorities in education. They deserve our most serious consideration (Schutz, 1970, p. 41; Carter, 1968, p. 19).

> Knowledge of needed change does not ensure that they will be made. A major need is for tools and techniques by which educational personnel can increase the probability that improvements will occur. (Cook, 1971, p. 171)

And, as Havelock poignantly says, there is a need to institutionalize follow-up mechanisms to forestall discontinuance (1969, p. 10-73). As was mentioned earlier, an innovation should be continued only if it meets project needs and educational goals and directions. Discontinuance is not inherently an unsatisfactory outcome, but it is a tremendous waste of resources (personnel, time, and money) if a project is discontinued without reason. Hearn, in his doctoral dissertation discusses the discontinuance of Title III, ESEA, programs and comments upon factors accounting for continuation or cessation of programs (1969, ERIC #032 448). Many other researchers have mentioned the possibility of discontinuance and its eventual effects on

educational credibility. Generally, it is felt that continuation should be on the basis of need and goals/ objectives of the district.

Warren G. Bennis has criticized the existing theories of social change for their callous disregard for the factors of directing and implementing change. He sees no viable theory of social change, and comments that the existing theories are "suitable for observers of social change, not for practitioners" (Bennis, 1969, p. 64).

His colleague, Robert Chin has identified these theories as "theories of change, and not of changing" (Bennis, Benne, and Chin, 1969, p. 64). Chin suggests seven prerequisites for a theory of changing:

a. manipulable variables--accessible levers for influencing the direction, tempo, and quality of change and improvement.
b. variables must not violate the client system's values.
c. cost of usage cannot be prohibitive.
d. a reliable basis of diagnosing the strength and weakness of conditions facing the client system must be provided.
e. phases of intervention must be clear so that the change agent can develop estimates for termination of the relationship.
f. the theory must be communicable to the client system.
g. it must be possible to assess appropriateness of the theory for different client systems. (p. 64)

As if he were supporting the contention that a theory of changing is needed, Carl Rogers demands that one of the central needs of American education is for changingness (1968, pp. 120-121).

The question with which we are faced is not should we change but how? This concern permeates many fields of endeavor, with education being in the forefront of the efforts of the government and foundations. There have been strategies in the past, and they have failed--miserably. Dionne (1970, pp. 120-127) has listed the main strategies of failure as: The Administrative Approach, The Grass-Roots Approach, and The Demonstration Approach. Each of these approaches failed to take into consideration four components of a school system which must be known and integrated into a strategy. He has made a model of these:

> The goal attainment (G.A.) segment contains all those processes which constitute the district's approach to establishing and accomplishing goals. The adaptive (ADAPTIVE) segment represents the manner in which the resources of the district are generated. The pattern maintenance tension-reduction (PMTR) segment represents the manner in which the district gains commitment from the professional staff to the goals valued by the system. The integrative segment (I) represents those processes by which the activities of the various departments within the district are integrated.

As Dionne sees it, if any of these components is overlooked the implementation/adoption and diffusion of an

innovation is in trouble or will plainly fail.

Finally, of the strategies which have failed, Guba points out that hucksterism (e.g., the Great Teaching Machine fiasco) does take place and, "this fact may be the best argument one can muster in favor of well organized diffusion efforts . . . " (Guba, 1968, p. 53).

> If a fraction of the money that is currently being spent to change educational practices were spent to find out how to succeed in making such changes, a great deal would thereby be saved. . . . Until then, it is likely that we shall continue to waste many man hours in an abortive effort to modify educational practices. (Smith, 1963, pp. 9-10)

Sadly, this comment was made in 1963, and efforts to develop strategies are far behind efforts to disseminate knowledge about innovations even today. But a substantial body of research has been published since 1963 as is evident in Chapter II of this dissertation--Survey of the Literature.

The last great inhibitor of change in education is the professional school of education. The aspects of the professional school for change lie in two main areas: preparation of educators (teachers and administrators) and knowledge linker (between researchers in many disciplines and professional in the field). Heinich in his dissertation at the University of Southern California commented

that it is dangerous to challenge the paradigm of one's own profession, yet there is a body of evidence to indicate that it is the professional school of education which acts to inhibit change in education (Heinich, 1968).

The American Association of Colleges for Teacher Education asked John Goodlad to discuss teacher education in their Bulletin. He commented on current practices when he said:

> It becomes apparent, therefore, that financial resources must be directed toward those strategies that link schools seeking to change with teacher education institutions seeking to shake out of established patterns. In brief, the teacher for tomorrow's learning must be prepared in school settings endeavoring to create a new kind of tomorrow. Most of today's teachers are prepared for yesterday's schools . . . (Goodlad, 1971a, p. 5)

Similarly concerned, Francis R. Link decried the difficulties of implementing innovative ideas in the fifteen years she worked as a director of curriculum and research in a public school system (1955-1970). Early in her career she stated:

> I learned the obvious fact that new curricula could not survive on the back of one or two teachers who had been trained in a summer institute or by a committee that had worked to create a new curriculum guide. Simply stated no matter how one modified the curriculum one could expect little or no change unless teacher reeducation got into the bloodstream of the local school system itself. This basic idea guided my work.

> Teacher education had to be an integral part of curriculum development and change. (Link, 1971, p. 178)

In discussing how to prepare teachers to be persons, Marcia Buchanan in Phi Delta Kappan makes an astute observation:

> We have tried a number of ploys to bring about change. Apparently aware of the lag between where we are and where we need to be, educationists spend a disproportionate amount of time talking about change.
>
> Since our cognitive manipulations for change have not given us the results we wished for, perhaps it is time to seek change in the affective domain. We talk change, but practice the same old status quo. (1971, pp. 614-615)

Carl Rogers, the National Training Laboratory, and many behavioral scientists have pointed out the need for changes in our attitudes to precede changes in our behaviors. The two are so interdependent that working on behavior can assist in the formation of new attitudes. Nonetheless, regardless of where the process starts, educators must approach the school with a different concept of what it is about--and this will occur best if they are prepared to do so in their professional experience, both pre-service and in-service.

In addition to changing the approach of teachers, educational administrators must also have extensive training in new approaches to education. Keith Goldhammer makes

a good case when he says:

> The needed changes in education will not take place because individuals are exhorted to change. Individuals must be dissatisfied with current practices, programs, or conditions before they will be motivated to produce the kinds of changes that are needed to make education the vital agency that it must be both for the human beings growing to maturity and the total fabric of society. Perhaps the root of our problem today is that our administrative preparatory programs have been socializing programs which have made individuals too satisfied with the status quo. Most likely we could accomplish our major objectives more readily if we were to help those who are a part of our preparatory programs become dissatisfied with what is happening, and then proceed from there. (1968, p. 184)

An administrator seeking better ways of educating would be more likely to look to the future, to have goals, to develop programs, and to devise in-service educational experiences for the staff. It is not denied that such administrators do exist; the problem is to increase the number of administrators who will attempt to effect changes in education so that it will be more appropriate to the needs of learners and of the society in which those learners will live. Such a condition requires that administrators, too, be involved in in-service experiences which will heighten their awareness of educational alternatives, though seminars must be followed up with support systems in which strategies for adoption of innovations are a reality. Much as one or two teachers cannot carry the burden of

curriculum revision the administrator cannot be expected to carry the burden of revamping structure of function of the district/school without auxiliary support for knowledge utilization.

Finally, the knowledge linker function of the professional school must be given serious attention. Havelock notes the condition of professional schools as compared to academic schools/departments, and makes significant comments on the role of professional schools as knowledge linkers.

> In practice, however, the professional school is not a wholly creative force. Many of its members have an exclusively academic career orientation and are so insulated from the service function of the profession that they have no current conception of consumer needs and problems and no interest or concern for meeting them. At the same time the professional school . . . is marginal to the university, partially shut off from the main stream of new scientific thought emanating from the academic departments. The weakness of the professional school as a linking mechanism is most glaringly apparent in the shabby and poorly financed efforts to provide university-based continuing education for the members of the profession.
>
> . . . The older, more prestigious, and better organized the profession, the more powerful will these conservative tendencies be. At the same time, however, the older and stronger the professional school, the more likely it will be to form an effective bridge between research and practice. (1969, p. 3-22)

Thus, the next concern for consideration in a comprehensive model for educational change comes to the fore. Knowledge utilization, and the range of problems

encountered in transferring research (both pure and applied) to practical daily operations must be considered. The linking agency which must facilitate this transfer will be given consideration.

Knowledge Utilization, Research to Practice

Much as the professional school of education is conservative, and resistant to change, the scientific professional network is highly restrictive and inhibitive of exchange with user groups. Academic researchers who consider their efforts to be "pure" or basic research, do not like to taint it with a stigma of application. Thus, the difficulty of getting to the most recent findings in a research area are doubly jeopardized--first by the scientific information network, and second by the marginal position of the professional school. It is ironic that the professional school is truly "marginal" in the sense that the term is used in sociology: it is part of two groups (research-academic community and application-school district community) yet is not accepted by either. The role identity crisis which the professional school faces thrusts it into this position of wanting to be "academic" and finding full respectability in that domain, while

finding it necessary to "train" practitioners in the art of teaching. Until we can overcome the dichotomy of artist-scientist as opposite ends of the poles, there is little hope for the professional school. (Havelock, 1969, pp. 3-15 to 3-16, and Heinich, 1968, do a most informative job of discussing the dilemma mentioned above.)

Many writers indicate that the basic problem we face with information utilization is just that--we need to utilize what we have. Thomas F. Green indicated that "the problem for the knowledge society is not so much production as it is distribution" (1970, p. 115). Discussing this dilemma between knowledge production and utilization as it affects education Kent finds that,

> today there is no specific evidence that the great educational problems are awaiting further research results before they can be solved. The difficulties which seem critical today are those of putting into effect what we already know . . . (1968, p. 51)

The circumstance in which education is found is that the behavioral sciences have provided a wealth of "pure" research which awaits development so that it may be understood and utilized by practitioners. As Kent indicates, there could be less emphasis upon additional basic research and more upon the development of applied research. Havelock (1969, p. 10-62) also upholds the need for

"deriving implications from research" as one of the most critical problems facing educators. He also distinguishes between "practice knowledge" which is developed and ready for diffusion, and "research knowledge" which needs preparation to be utilized (pp. 8-18 & 8-31).

Carl H. Rittenhouse describes in vivid detail the concern of the educational practitioner when it comes to retrieval and utilization of knowledge.

> Educational practitioners encounter many problems in acquiring and using the information they need for their planning, decision-making, and implementation activities. The information, especially if it concerns local school district programs, may not have been printed and distributed. Since there is a great deal of information, searching is arduous, and the necessary search and retrieval tools may not be at hand. If information can be obtained, it may be in unsuitable formats, too lengthy, or not presented in terms that can be readily understood or assimilated by local school personnel. (Rittenhouse, 1971, pp. 76-77)

All this points to a more significant need--for an intermediate, or linking, agency. There must be some equivalent to the Agricultural Extension Service County Agent to act as the liaison between "pure" researchers and their findings and the needs of practitioners.

Linking Agency, Change Agent

Rankin and Blanke (1968) reiterate the gap between theory and practice, but add the admonition that "special

organizations must be created and individuals trained to bridge this gap if educational improvement is to be consistent, effective, and efficient." Their qualifications are particularly interesting. Both Guba (1968, p. 39), and Havelock (1969, p. 11-3), indicate a need for a central agency, mechanism, or facility to bridge the gap between consumers and producers of knowledge, or to store and disseminate knowledge. Havelock adds the advice that linking roles require heavy federal support (p. 7-28), and that the role of the federal government is to monitor, support, facilitate and coordinate linkage (p. 11-4).

In a paper prepared for the University Council for Educational Administration, October 1967, Ronald Havelock notes:

> Knowledge linkage is a serious and a massive problem. Effective retrieval alone, disregarding dissemination, is becoming a problem with which individual universities and companies can no longer cope. Add to this the dissemination needs, including packaging, conveyor and consultant services, and effective opinion leadership, and we are then talking about a multi-billion dollar enterprise involving the coordinated efforts of ten of thousands of skilled professionals. This is what is represented to a degree in the Agricultural Extension Service. We have no equivalent in any other field. (Havelock, 1968, p. 98)

In a moment of wit, Norman Hearn states that there is an unwritten code of innovations: " . . . it is better

to do unto others than to do unto thyself" (1972, p. 358). More seriously, though, he continues, " . . . what we need now are more effective methods of channeling and arbitrating the energies of this multitude of change agents. Such an undertaking requires structure and a science of innovating" (p. 358).

While discussing the need for an intermediate organization it seems appropriate to review the observation of Richard Farr, Institute of Communication Research at Stanford University, regarding the advantages of establishing a permanent linking institution. In this ERIC Occasional Paper he describes the following characteristics of a knowledge linker in a permanent organization:

> . . . economic security . . . [;] identity . . . marginality begins to diminish . . . he is working for a duly constituted functioning organization . . . [;] and finally, a linking institution permits the coordination of the multiple functions required of a link in the flow of knowledge chain. (1969, pp. 5-6)

A strong case is made that we must (1) build an institution for educational change, (2) recruit candidates to fill the jobs, (3) train the candidates, and (4) supply support material and strategies (Havelock, 1969, p. 7-38). In 1962, Elihu Katz concluded that "the availability of information that an innovation exists is not enough to make

for its adoption" (p. 18). He felt at that time that additional factors must be sought to explain the decision to adopt and differentials in rates of adoption.

It is certainly evident that knowledge of innovations is not enough to make for adoption in education. There is a body of literature which indicates that a major amount of information is available, but it is not utilized by practitioners (Rittenhouse, 1969, p. 1).

Change Processes, Implementation, Diffusion

The literature on change discusses communications, dissemination, diffusion, innovation, adoption, and recently systems. In this section a cross-section of needs will be reviewed for applicability to the basic concern for improving education.

Paul Mort of Columbia University studied diffusion of educational ideas and practices for forty years, and his students are still working on the concept of "lag" which he originally proposed. In his studies it was found that a period of fifty years was required for an innovation to be adopted to the 98 per cent level, and it took fifteen years to get the first 3 per cent to adopt. Other researchers, too, have noted that diffusion rates formed from

cumulative adoptions yield an "S" curve. Adoptions start slowly, go through a period in which the cumulative numbers rise steeply, and then level off as the saturation point is reached. The question arises as to how this process may be facilitated so that the last to adopt--"laggards"--will not be adopting an "innovation" so long after its introduction that it has been replaced, not once but many time over!

There are few validated models or studies of this, but some efforts have been made, and currently a number of institutions are working on facilitating the diffusion process and the adoption rate, in addition to helping the institutions in selection of innovations for adoption. The studies and institutions are reviewed later in this report.

One of the anticipated effects from coordinating efforts in the change process will be synergy--derived from synthesis and energy. An analogy from physics will help to explain what is meant. A laser provides a coherent patterning of waves so that they maintain their frequency phase. As such they can cover long distance without dispersion of energy. Such is the desire of persons who work in the field of diffusion--to create a system in harmony so that energy is not dispersed on meaningless out-of-phase functions. In essence, to create a harmonic

system in which the output is, by normal standards, greater than what could be expected; some say greater than the input!

In order to reach toward the goal, Havelock recommends that resources must be able to deal with the needs of the change process, particularly as regards the user, the message, and the medium (1969, p. 11-30). Donald Miller of Operation PEP (a California plan to Prepare Educational Planners), noted that "the patterns of dissemination of knowledge . . . are too slow and, subsequently, promising innovations are not widely implemented for many years" (1968, p. 1). And, "coordination of effort, dissemination of knowledge, diffusion of proven innovations and strategies for implementation of innovations are fundamental problems in the current educational dilemma" (p. 1).

In a powerful statement on the need for implementation strategies, Louis Bright and Hendrik Gideonse said:

> The improvement of American education depends upon the systematic investigation of the process and the necessary condition for learning, the development of instructional objectives, strategies, and materials based on the knowledge educators and others accumulate about the learning process, and finally on the implementation of those strategies and the use of those materials in instructional settings across the country. (1967, p. 89)

Essentially, it is necessary to have the knowledge about learning and then to have a way to do something purposive with it; strategies for implementation are that something purposive.

In concluding a chapter in Planning for Innovation through Dissemination and Utilization of Knowledge (1969), Havelock posits four pressing needs: there is gross underdevelopment in the component called "Development"; there is an inadequate appreciation of the concept of "Consumption"; there is little shared information of the mutual interdependence of components in the diffusion process; and, there is a major need to work together, systemically! (p. 3-35). He does say systemically and not systematically: the distinction being that the former is within a system, the latter a method. And it is the method of looking at a system that gives an effort diversity and power.

Some critics of education have argued that education, perhaps even the entire society, cannot be refined, or changed implying that total destruction of the existing framework is necessary. Perhaps, they say, public education is unfit, and may never meet the needs of students, or the community. There is certainly a recent outcropping of experimental schools to uphold this viewpoint. Can public

education grab the proverbial horns of the dilemma and change rapidly enough to become effective and meaningful for the body politic?

Egon Guba has defined a concept of neo-mobilistic change which he believes will accomplish the task. It is a step beyond "evolutionary" or "homeostatic" change processes, and he comments about it as follows:

> Whatever we do about education we will not do overnight; the system continues and requires continuous adjustment, refinement, and guidance. There are many problems that can be managed very well by such an approach. But to suggest that this is all that we mean when we talk about educational change is unthinkable; for unless we can produce more dramatic and startling changes than we have until now, the system may well be doomed.
>
> Apparently then, what I, at least, have in mind when I talk about educational change is neo-mobilistic change. (1968a, p. 11)

On the pages that follow Guba provides his view of seven factors which account for our failure to effect meaningful change (pp. 11-17). And, he concludes with a recommendation that any model of the change process which is developed must have RELEVANCE and IMPACT (p. 19). The last statement is certainly worthy, although somewhat discouraging considering the quality of personnel working in the field who have apparently not yet come up with a model which meets his criteria.

D. W. Livingstone provides an insight into the dilemma of innovators looking toward new models of organizational development in the hope of finding a climate for facilitation of their ideas. He finds,

> Conflicting findings may be a healthy sign in the early stages of any field of inquiry. But, while empirical research on innovation has continued to proliferate, cumulative theoretical advance has been largely absent. . . . There has been no lack of concept formation with regard to either the process, the characteristics, or the determinants of innovativeness, . . . but efforts to construct integrative frameworks are very rare [Emphases mine]. (1970, p. 1)

Thus, the challenge, and the task, are clearly delineated. A model based upon previous frameworks, which will be cumulative and integrative, and will have RELEVANCE and IMPACT! The task is significant, as may be observed in the last two quotes:

> The push for diversity, meanwhile, is igniting bitter conflict in education. . . . Failure to diversy education within the system will simply lead to the growth of alternative educational opportunities outside the system. (Toffler, 1970, pp. 272 & 274)

Writing on education "In the Year 2000" from the article in the Bulletin of the American Association of Colleges for Teacher Education, John Goodlad projects that,

> School as we now know it will have been replaced by a diffused learning environment involving homes, parks, public buildings, museums, business offices, guidance centers. Many such resources that are now un-endorsed,

> unofficial, unrecognized, unstructured, or unsupervised --and unused--will be endorsed and made fully available for learning. There will be successors to our present schools--places designed for people to gather for purposes of learning things together. (1971, p. 4)

This scenario which he proposes is either very exciting or very traumatizing--dependent upon your view of current American education. What is more significant is that it is different! And because it is different, regardless of whether or not it comes to pass, there must be adjustments, adaptations, perhaps even major restructuring of the processes and frameworks of schools. It is because of this need for continual modification and adaptation that this study is being done.

Purpose of the Study

The purpose of this study was to develop a paradigm of the educational change process using the system methods of analysis and synthesis. Through a review of the literature a proposed generic model will be derived which will attempt to fill the void mentioned in the earlier portions of this chapter.

Assumptions

1. Public education will continue to be the major organization for schooling youngsters. This is implicit in the effort of this study.
2. The fields of sociology, management science, management systems, information systems, and the related studies of diffusion, change, administration, system analysis and synthesis, and information processing contain enough corresponding elements that a generic model/paradigm may be developed.
3. The concepts of "force-field analysis" and "forcing function" are somewhat related, and are relevant to the diffusion, adoption, and change process.
4. The change process can be institutionalized[3] in the public education system.

Questions to Be Answered

1. What components, phases, steps of existing studies on educational change, diffusion, adoption and

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[3] Institutionalized is used in the sociological sense of meaning patterned ways of behaving--it does not mean the development of an "organization"/institution.

educational and industrial management can be intersected with the findings and methods of system analysis, synthesis, and management information handling to provide a generic model of change?

2. What questions exist or can be developed which will provide guidelines to educators planning an educational change? Ultimately, how can these questions relate to the paradigm of change?
3. What information exists on school district characteristics and requirements that can be extrapolated into the generic model/paradigm of educational change?

Delimitations

1. Because of the tremendous volume of research and study subsequent to the launching of Sputnik in 1957, and to the federal legislation and support to study educational change, the bulk of the research in this study will be more recent than 1958, and most of the studies will be derived from studies done in the mid and late 1960's. Also, in an attempt to create a state-of-the-art paper on educational change and diffusion, it is necessary

to use the most recent findings available.

2. The model which is developed will not contain the detailed subsystems which would be the outcome of a particularized system analysis. The proposed model/paradigm is to be generic and comprehensive; as such it will provide the theoretical framework for adaptation to particularized conditions.
3. Research from the fields of sociology, management science, educational administration, and data-information science will be included. Other research areas will not be included unless it is imperative to the development of the paradigm.

Procedures

The research and development of a paradigm or model does not proceed in the same method as a more traditional research design. For that reason, the following description of procedures is provided. As in historical research, the major impetus comes from the review of past studies through the literature. The preparation of a theoretical model must, however, be built upon the accumulated knowledge of other researchers in the field and upon their paradigms. Thus, the procedures for selection of

components must be based upon newer methodologies. In this case the procedures which have been established for system analysis and synthesis will provide the basic methodology. That is, within the constraints of working with a theoretical system rather than a "real" system, and having to review the literature rather than the parts of an organizational system, certain adaptations of the analysis/snythesis procedure will be made. Robert Heinich took such an approach in challenging the paradigm of instructional management which was generally accepted at that time. He pointed out that the intersection of different disciplines of study frequently created a new awareness and model, and that such a process is not amenable to the traditional methodologies of science. That there is an intuitive or artistic "leap" from one frame to another in the creation of a new way is evident from history, but during the past several hundred years such intuitive leaps have come under criticism as not being "validatable" or "empirical." It has been shown in Heinich's dissertation, and in other research in the field of philosophy that the test of time is often the only valid measure of a new paradigm.

But, to state the procedures in more detail: first, an extensive review of the literature was completed using

the traditional research sources such as periodical guides, abstracts, and poring over periodicals above and beyond the citations found in the guides. Then a newer and less traditional approach was used: the computerized ERIC search was based upon selection of descriptors from the ERIC Thesaurus, and these components were placed into the computer, and through a process of matrix intersection a selection of documents was made. These techniques provided the bulk of the periodicals and documents.

The card catalogs of libraries at the University of Southern California, University of California at Berkeley, Stanford University, and the University of San Francisco were searched using the key words and phrases identified in the proposal for the dissertation.

The material thus acquired was read and a search for patterns, concepts, unique approaches, and related fields was made. The essence of this search was to determine and analyze the components of existing theories and validated models or paradigms of the change process and its several parts.

The second aspect of the system approach, after the analysis, is the synthesis. It is at this point that the most exacting work is needed. The generic paradigm which

is developed must reflect a compendium of ideas presented from a variety of sources. It is in the scope of sou. ces, and the arrangement of them into a generic paradigm that this research obtains its value. Much as in a system analysis it is relatively easy to determine the way that the functions were carried out, it is much more exciting--and exacting--to restructure the paradigm/model in a way that makes it more functional.

Definitions

Most of the terms used in this paper are commonly accepted in the field of education. This section will only delineate those terms which have a specific meaning in the context of information utilization, educational changes processes, including dissemination, diffusion, and innovation, and management sciences, including management information systems and computer-based storage, retrieval, and analysis functions. Terms defined here will be those most consistently used throughout this paper; terms used in single locations or specific to a section will be defined at that point and in the context in which they are being used.

Adoption. Adoption is a decision to continue full use of an innovation (E. Rogers). And to some extent the idea of John B. Haney, et al. is appropriate, "people never adopt a process, they adapt it:" For in most instances the process of adoption includes the modifications of a program necessary to integrate it into an existing structure and function.

Change. Change is a series of transitions from one stable state to another (Donald A. Schon). The "stable state" represents only a fix in time, not a continuing condition. Change is a natural process of adaptation to new circumstances, and man is the only animal who willfully decides to maintain a status quo.

Change agent. Change agent is a professional person who attempts to influence adoption decisions (E. Rogers).

Decision-making or process. Decision-making or process is the process by which an evaluation of the meaning and consequences of alternative lines of conduct is made (E. Rogers). The decision point is one part of the total process at which the selection of a path occurs. Donald R.

Miller defines decision-making as the consequences of choice, defined probabilistically in terms of a range of possible outcomes, based upon complete, accurate, relevant, and timely information. That is certainly the ideal, and one of the reasons for the development of management information systems.

Demonstration program/project. Demonstration program/project is the operation of an innovative program in a "typical school" (not a special school such as a university school or a demonstration center). The school should be as similar to the one which the potential adopter represents as is possible (Miles).

Dissemination. Dissemination is to create a wide-spread awareness of the invention among practitioners; to inform (Guba). Or it is the process of giving and receiving information about an activity, person, or idea (Hearn). The preferred way of looking at dissemination is "spreading the word" (Monroe). It is distinguished from spreading the practice (diffusion). Guba includes dissemination as a component of diffusion, though in this paper they shall be considered as separate parts.

Diffusion. Diffusion is the process by which an innovation spreads (E. Rogers). A more involved definition which is widely accepted (as noted in the literature) is that of Elihu Katz, et al., "acceptance over time of some specific item, idea, or practice by individuals, groups or other adoption units, linked by specific channels of communication to a social structure, and a given system of values or culture." And, as mentioned in dissemination, above, diffusion is spreading the practice in contrast to spreading only the word (Monroe).

Diffusion process. Diffusion process is separately defined by E. Rogers as the spread of a new idea from its source of invention or creation to its ultimate users or adopters.

Evaluation. Evaluation represents a comprehensive set of behaviors involved in specifying objectives of a program and the assessment of long-range and short-term effects (Miles). It is traditionally used to "judge" (Guba) and to justify a program rather than aid in revision of a program (Abedor and Gustafson). Stufflebeam has prepared a diverse way of viewing evaluation by defining five types of evaluation and the kind of measurement each provides:

emergent is a tool to aid in decision-making; context is continuous determination of a school's status; input assesses possible responses to a need/problem; process provides feedback; and product determines feasibility, quality, efficiency.

Feedback. Feedback provides essential information about the results of action, necessary for the successful attainment of objectives (Nokes), and is a closed-loop pattern between management and performance units to compare demonstrated performance with stated criteria (Donald R. Miller).

Force-field analysis. Force-field analysis is a technique developed by Kurt Lewin which takes into account all the factors which act on the client system; forces which might inhibit or facilitate adoption of an innovation, and forces which the innovation itself may exert on the system (Havelock).

Forcing function. Forcing function is the condition in which instability is induced in a "force field." Crises, governmental intervention, historical events may contribute to this situation in which an organization or organism must

adapt to a new pattern of operation. (The original inspiration for this idea came from Leo Persselin at the University of Southern California.)

Heuristic. Heuristic has several definitions, each of which shows the term in a slightly different light, and all of which provide a comprehensive view. From the Greek root, it is to invent, to discover, helping to discover or learn; sometimes used to designate a method of education in which the pupil is trained to find out things for himself (Webster's New World Dictionary, 1960). More specifically defined in terms of computer programming and the operations which it provides are the following: "heuristics are acquired; how the game is won, compared to rules which define how the game is played!" (Haney, et al.). Heuristic programming is "incorporation of 'rules of thumb' or principles into computer programs which carry no guarantee of a solution to a problem" (Boguslaw; deGreene); "sensitive to the need to 'learn' and apply new information or knowledge to future problem solving situations" (Boguslaw); "methods that aid in discovery--an approach to system synthesis" (Wilson and Wilson) (incidentally one of the more powerful capabilities of the human brain, and the

result of a study known as "artificial intelligence" in which that capability is being simulated by computers); "a program that improves with experience; it learns from past mistakes" (Brightman). Heuristic programming is a "trial and error" attempt to solve problems.

Heuristic approach. Heuristic approach provides action guides even in the face of completely unanticipated situations, and situations in which no formal model or analytic solution is available (Le Baron).

Heuristic retrieval. Heuristic retrieval is opposite to the usual so-called inventory retrieval. By means of heuristic retrieval the searcher finds one document that is relevant to his request, and lets his search spread out from there. The depth is tied to the search, and to the output, rather than to the input (Cheydleur).

Information storage and retrieval system. Information storage and retrieval system is a computer operation which can synthesize stored data and produce "new" information based on instructions given via a computer program (Emmert and Brooks). (This is the basic method whereby computers convert data into information for use in management information systems.) Computerized information

storage and retrieval systems as decision-making aids by public agencies to aid in the process of change is mentioned by A. F. Westin.

Information systems. Information systems are networks of communication channels that acquire process, store, retrieve and redistribute data (Piele).

Implementation. Implementation is the action involved in adoption; it consists of the strategies used to create an adoption climate and attention to traditional administrative functions (size, cost, availability of personnel, and political viability) (Guba).

Improved educational practice. Improved educational practice is a continuous developmental process which is based upon desired objectives (national, state, and local) (Donald R. Miller); an approach to improving the effectiveness and/or efficiency of an operation, based upon criteria (so that the change is not random, but purposive and perceived as better). This includes both instructional and administrative practices.

Innovation. Innovation most commonly is identified as an idea perceived as new (E. Rogers) regardless of how

"new" it may be. Others are: "a deliberate, novel, specific change which is thought to be more efficacious in accomplishing the goals of a system" (Miles); "a break with routine and habit; it disrupts unreflective ways of thinking, feeling and behaving; it requires a heightened measure of attention and interest in the matters at hand; it forces the participants, and especially the creator, to think in fresh ways about familiar subjects, to reconsider old assumptions" (Trow); and it "differs from change in that innovation assumes that what is proposed can be consciously and planfully justified on the basis of . . . criteria" (Keil).

Knowledge utilization. Knowledge utilization is a study of information production and dissemination which considers the resources system, the message(s), the user system, and the complex interrelationships in moving knowledge from source to source. Basically, it is the process of taking knowledge from producers to practitioners (pure to applied), and providing the feedback to the producers (researchers) for refinement of their research. Knowledge utilization depends very heavily on the "linkage" concept prepared by Havelock.

Linker. Linker is one who provides knowledge to practitioners through several roles which include conveyor, consultant, trainer, leader, innovator, and others (Havelock).

Management information system. Management information system provides a method of acquiring data, storing it and processing it, so that information is the yield and managers may use it at different levels to make decisions in planning and operations (Piele).

Man-machine relationships. Man-machine relationships (also man/machine) is a procedure where the vast memories and calculating speeds of computers become direct extensions of man's mental processes (Vannevar Bush, discussing man-machine symbiosis).

Misoneism. Misoneism comes from two Greek words: miso meaning "to hate" and ne or neo meaning "new." When combined with the Italian ismo it becomes misoneism and means "hatred of innovation or change."

Models. Models are a means of replicating real phenomena (Brightman); a visual aid holding details in focus, fixing assumptions and serving all interested parties

as a mnemonic device (Meals); and in information systems flow charting "rudiments of all models are informational inputs" (Cleland and King).

Paradigm(s). Paradigm(s): a pattern, example, or model (Webster's New World Dictionary); "a conceptual framework which directs experimental inquiry, and like other theories are not in and of themselves provable. They survive because they better fit, describe, and explain certain key principles and postulates than do other competing paradigms" (Heinich).

Planned change. Planned change is a process of deliberate changing which meet stated criteria--more than just a plan to change; criteria are significant! (Bennis, Benne and Chin).

Planning. Planning is preparing alternative approaches to long-range and short-term expectations and objectives (Per Dalin).

Strategies of change. Strategies of change represent an overall program to effect change in an organism (tactics are the steps whereby a change is effected), six steps are defined in strategies by Donald Bushnell.

Strategy. Strategy is a "means for causing an advocated innovation to become successfully installed (Miles); and "large scale planning and directing of operations in adjustment to the combat area (Lawler). (Lawler subsequently described the combat area as the classroom and the strategist as the teacher--if that provides some insight into the conditions of American education.)

System. System is a word for which there are innumerable definitions. In spite of the variety, most seem to have the following components and pattern: "interrelated parts working toward a goal" (Piele); and "the sum total of separate parts working independently and in interaction to achieve previously specified objectives (Kaufman).

System analysis. System analysis is "a generalized and logical process for identifying and breaking down into as many carefully distinguishable parts as possible, the structure, parts, and interactions of a system (Miller) or as Cleland and King define it, system analysis is "a combination of a set of tools, philosophies and techniques which is designed to facilitate choices between alternatives in a fashion which maximizes the effectiveness of resources

available to the organization." (System analysis is also known as systems analysis, and, in fact, the word system or systems seem to be used interchangeably in the literature.)

System approach. System approach consists of specified steps in defining need, determining objectives, identifying constraints, proposing alternatives, making a selection, carrying out the implementation, evaluation, and modification of a program/project (based on Lehmann). (For a detailed analysis of the system approach see Roger Kaufman, "System Approach to Education: Derivation and Definition," Audio-Visual Communication Review, Winter, 1968, pp. 415-425.)

System(s) management. System(s) management "can be defined as the process of planning, organizing, coordinating, controlling, and directing the combined efforts of contractors and other relevant organizations to accomplish system program objectives. It involves an integration, in a time-phased manner, of organizations, responsibilities, techniques, knowledge, and data and documentation" (deGreene).

System synthesis. System synthesis utilizes the data from system analysis to select solution strategies and vehicles for the identified performance requirements (Kaufman); and, "a highly specific and logical process for combining separate elements into a desired orderly system after first identifying and determining the required actions, patterns, and structures necessary for system performance" (Miller).

Summary

This chapter covered the statement of the problem and defined it comprehensively by a number of key concepts which need attention. These concepts included the history, philosophy and general background of educational change; the need for assessment at all levels to aid in the development of objectives to meet the needs defined; the system approach as a procedure for comprehensively analyzing the conditions affecting potential change, and the synthesis to develop cogent strategies for accomplishment of program objectives; models and the modeling process as a tool of defining and clarifying relationships in complex situations; management functions, decision-making, and management information systems as procedures and techniques to

accomplish educational change; forcing-function and crises as catalysts of educational change; community participation and related concepts of a broad-base participation approach to need identification, goal setting, and community support; change inhibiting factors were discussed; change strategies were considered; knowledge utilization--the process of going from research to practice knowledge was mentioned; the linking agency or agent was analyzed as a method of effecting change; and finally a brief overview of and introduction to the literature on the change process was included.

The purpose of the study was presented, as were the assumptions, delimitations, questions to be answered, and definitions.

Organization of the Remainder of This Study

Chapter II will present the Survey of the Literature, as it has been organized into the specific fields of knowledge required for this study.

Chapter III discusses the Research Methodology of a system approach to the development of a generic model.

Chapter IV presents the Model of Educational Change, a generic model developed from the analysis and synthesis

of the literature; and a paradigm of educational change.

Chapter V includes the Summary, Implications, Conclusions, and Recommendations for Further Study.

CHAPTER II

SURVEY OF THE LITERATURE

Introduction

In an interdisciplinary study the survey of the literature can become a major undertaking. As was shown in the first chapter, there are many fields of inquiry and study represented in the problem of educational change. Thus, the following categories have been defined to cover the scope of processes in educational change. It is duly noted that no matter how comprehensively the literature was searched, it is inevitable that some material was overlooked. Every attempt was made to provide a comprehensive search, but the above caveat is significant, and is mentioned for its value at this point.

The major body of knowledge is in the literature on diffusion and knowledge utilization although there is a variety of ways to describe these fields of study. In order to provide a framework for the diversity of material found in the literature the first category will be entitled

Change Processes. It will include: change, change processes, planned change, renewal, long-range planning, alternative futures, innovation, dissemination, adoption, implementation, diffusion, knowledge/research utilization, development, linkage, linking, and change agent/agency, as basic descriptors. In addition, however, strategies, demonstration programs/projects, and community attitudes and involvement are significant components. Initially it was thought that strategies could be a completely separate field, but it was found that most of the comprehensive studies included strategies as an integral component of change processes. Closely allied with strategies, in the literature, are the studies of communication processes such as interpersonal relations, interaction, group processes (T-group, small group interaction), and force-field analysis. Further, communications were included with the emphasis on mass media (dissemination), and information/knowledge networks (for selective and usually professional dissemination). And, finally came the question of professional preparation of teachers, administrators and other professional and para-professionals. Initially it, too, was to have been a separate field of study. The consideration was given to placing it with the second general

category--management and administration--but that covered only in-service education and not preparation for professional experience. Again, after carefully reviewing other works it was felt that this could most appropriately be placed in the change processes--strategies--category.

Although the category appears to be overwhelming, such was not the case; the literature of the behavioral sciences is so integrally related that these fields of study could hardly have been separated.

The second major category was designated as Management and Administration. It includes literature discussing both the theory and practice of managing. Sections included in this category are decision-making, power considerations, and organizational structure and function. Again the field of power considerations is closely allied with community involvement mentioned in category one under strategies. Power, as it is used here, represents the intra-system structure and function. There was also some concern of the relationship of management techniques to a significant component of the third category on management information systems. But, because of the integral growth of management information systems out of the broader study of information systems, it was left in that category.

The third category is the System Approach, including the fields of system(s) analysis, synthesis, the work on information systems which has grown out of information science, and models and modeling. Under information systems, fields included management information systems (a computerized decision-making/assisting support function with reports, and different levels and types of information), and the variety of network procedures used in management planning and decision-making. Finally, the new efforts at National Assessment of Educational Programs was included with Management and Administration under the function of information systems. The rationale for this inclusion was that the information provided by National Assessment is used by educational administrators and is processed by an information system.

These three categories, then, represent the scope and depth of the survey of the literature. Because of the number of studies encountered, it will be necessary to limit the review to the most significant works in each field. This was done by reading extensively in the fields and selecting those studies which were most often cited or quoted, and which appeared to have generated the greatest number of additional studies. Also, in the case of more

recent works (the past five years) they were selected on the basis of their findings and appropriateness to the development of the Generic Model. The criteria used in this selection was that the information had to provide a "goodness of fit" and "diversity" to the model and its task.

The Change Process and Its Components

Change and Changing

Most if not all theories of change are just that--theories for observers of change, and not for practitioners of changing (Bennis, 1969). Thus begins the emphasis of this research; to develop a theory of the change process which will be of specific benefit to those who wish to implement innovations, and yet, to allow for the development of more refined principles and generalizations of the change process through research based upon the model/paradigm presented. Robert Chin (1969) continues that a theory of change is for the social scientist and a theory of changing is for a change agent. He then provides guidelines for developing a conceptual model, and illustrates assumptions and approaches to three models of change: the System Model, the Developmental Model, and the Model for Changing: Intersystem.

Egon Guba (1967) presents an analysis and discussion of the overall field of educational change and presents his preferred components as Research, Development, Diffusion, and Adoption, in that order. It seems peculiar that he includes diffusion before adoption in consideration of the general meaning and use of the term diffusion. But, in his model he includes dissemination as a step in diffusion, and dissemination does usually precede adoption. In this paper, though, diffusion will mean the spread of adoptions. Guba goes on to a specific discussion of his plan for "neo-mobilistic change" in a paper presented in 1968 at Educational Media Conference (Indiana University, Bloomington). At that time he presented a comprehensive model of educational change including the following arms: Information, Development, Diffusion, Utilization, and Research. And he proposed "the model for a national system of educational change"--a model which he noted must have Relevance and Impact! (p. 19).

In a review of educational change, with implications for and examples of international application, Per Dalin (1970) provided an overview of the change literature noting that the educational system itself is functioning as a learning organism only if constant interchange between

components allows for meaningful change.

A survey of kinds of change and the success each has had was presented in the Phi Delta Kappan by Orlosky and Smith (1972) in which they reviewed seventy-five years of change attempts in education. They presented fourteen conclusions regarding kinds of change and the difficulty each faced in being successfully adopted. For example, change in instruction is more difficult than in curriculum or administrative practices (pp. 413-414).

David L. Clark (1965) mentioned three myths about change: the school is locally controlled, the school teacher is autonomous, and good teaching can never be evaluated. None of these is correct as Clark sees them. He then provided a change paradigm in which objectives, criteria, and relationship to change are viewed for the processes of research, development, dissemination, demonstration, and implementation--in a decision table format.

An interesting hypothetical construct of change models was presented by Doll (1971) which presented a Specialization Model (currently used), and an Aggregation Model (ideal type) for a number of change dimensions including, strategy of change, organization goals, roles of principals and teachers, classroom management, and

community contacts (among others). His proposal for an Aggregation model should provide some research hypotheses for empirical research.

The considerations of education and its relationship to society have been concerns of citizens for as many years as schools have existed outside the mainstream of preparation for tasks of survival (e.g., from the onset of the shaman after youngsters were taught directly by their parents). Change must occur(!) is a theme of many writers (Kaufman, 1970; Finn, 1964; Howard, 1968; Adelson, 1967; Toffler, 1970). Finn's comment is most insightful when he observes that if educators do not change they will find the schools run by others and they will be second level technicians (p. 351).

Recently the participants in a conference on change were asked what they wanted to change. The embarrassing silence was finally broken by some rather petty suggestions for improvement (Kimbrough, 1970). In this same vein Howard (1968) asks if we should not distinguish between superficial and basic change. Certainly this must be considered in developing priorities for change and in selecting change strategies based upon the complexity level of a given innovation/change.

The relationship of educational ends to innovational means is mentioned by Adelson (1967) illustrating the need for innovation to meet the needs ("ends") of education rather than to exist on its own cognizance. He continued that the change process must be institutionalized, and adoptions must be made selectively so that the adoption rate (emphasis mine) can be raised. Meanwhile, Toffler (1970) is cautioning against the rate of adoptions as being so frantic as to cause "future shock." Fortunately Toffler presents a very comprehensive view of the conditions of future shock with recommendations for the management of change (p. 379), knowledge about alternatives and managing change (p. 470), and technocracy and change mangement (popular democracy) (p. 477). He says that educators have been looking backward, and now must look to the future; "progressives were accused of 'presentism' so educational reformers of tomorrow will be accused of 'futurism'" (p. 402).

The study of alternative futures has shown a variety of approaches (Delphi, scenarios, forecasting) most of which illustrate that predicting the future is not possible, only describing a range of possibilities (Harman, 1970; Bell, 1969; Pfeiffer, 1968). Bell also notes that

futures research is to aid in decision theory and decision theory is normative not predictive (it states "what ought to be" not what will be). A futures orientation is necessary for renewal (Gardner, 1963). Gorman (1972) describes change processes and strategies as a means of renewal, and Shephard (1969) notes that schools have a "periodicity" (vacation times) which are inherently advantageous to renewal.

Gorman (1972) and Irvine (1972) describe strategies for change and specifications of an educational system of the future, respectively. Each outlines his view of what education ought to be in the future with recommendations as to how to get there.

Thus, a strong case is made in the literature for the use of a futures orientation in educational change and renewal. Renewal implies purposive, meaningful, basic change--not superficial change--and requires a sense of direction. In addition to direction the rate of change must be given serious mention. Not all models of change include the time frame and it is significant!

There are four comprehensive books on educational change and the change process reviewed in this dissertation. Each will be discussed in the section to follow. The

largest and most comprehensive, in that it is a review of the literature, as well, is Havelock's (1969). He is concerned with knowledge utilization and proposes a strategy which he believes will overcome the limitations of the previous three approaches to planning for innovation. Bennis, Benne, and Chin (1968) are oriented toward the planning process and include a body of literature on administrative behavior in the change process. Miles (1964) also looks to the planning of change in his discussion of innovation, but his emphasis is on adoption of innovations. Finally, the first major work on change processes was Rogers' (1962) work on the diffusion of innovations. Based upon 500 or more studies of change (particularly in agriculture) he developed a sequence of stages in the adoption process, characteristics of innovations, characteristics of adopters, and strategies for the change agent.

The Problem-Solver Perspective views the user as the point of emphasis. It assumes that the user identifies a need and the strategy satisfies that need (Havelock, 1969). Lippitt is a proponent of this approach.

The Social Interaction Perspective focuses on the communication networks of the user--the social relations in reference and peer groups (Havelock, 1969). Everett

Rogers is the major proponent of this view. Rogers' strategy includes (1) Awareness, (2) Interest, (3) Evaluation, (4) Trial, and (5) Adoption (1962). His kinds of adopters are Innovators (venturesome), Early Adopters (respected), Early Majority (deliberate), Late Majority (skeptical), and Laggards (near isolates). The significant component of his perspective is that of the "interaction effect" which is a snowball effect of dissemination of the idea about an innovation which leads to adoption which leads to the diffusion curve which has been upheld in studies by Mort and his many followers.

The Research, Development, and Diffusion Perspective views a rational sequence of events in the process of invention, development, production, and dissemination. It does not view the change process from the point of view of the user--it assumes that research is the starting point and that the user is relatively passive, though rational (Havelock, 1969; Gideonse, 1968).

Robert Mason (1962) criticizes Rogers' five stages in saying that only two are necessary--awareness and adoption. He further observed that "evaluation always occurred before interest-information seeking. Adoption was never the terminal item" (p. 115). Perhaps he defines

evaluation as a nonmeasurement opinion, for otherwise his sequence does not seem rational. He notes that after adoption, clients attempted to find rationale for their adoption behavior, thus to him adoption is not a last step. It seems that his perspective on Rogers' work is nit-picking, but he did base it on a study of 159 Oregon grass seed growers to give it empirical respectability.

The need for a linkage model is identified by Havelock (1969) as an approach to overcoming the deficiencies of the other three perspectives. The linkage model features

1. focus on the user as a problem solver.
    a) internal operations include felt need, diagnosis, problem statement; search and retrieval phase; solution phase and application of the findings to the problem.
2. user must be meaningfully related to outside resources.
    a) reciprocal relationships with resources,
        (1) resources must simulate need reduction cycle of the user, and use feedback to test the results of that simulation.

b) social influence network is built to be long lasting; both systems give and get information.

c) the resources system must be connected to more remote resources of its own.

And, the government must oversee this process.

Havelock then summarizes the seven components of a Dissemination and Utilization model (Linkage model): (1) linkage, (2) structure, (3) openness, (4) capacity, (5) reward, (6) proximity, and (7) synergy. Each of these is described in detail in Havelock (1969, pp. 11-20 to 11-30). He said that none of the current models of change were able to account for crisis events, and believes that this situation needs to be corrected in future models (p. 11-19).

It would appear that this crisis concern which Havelock describes could be described more aptly with the term "forcing function." The forcing function describes conditions which unsettle a client and cause some adjustment in behaviors. And, such a function can be derived from the models mentioned earlier (in spite of Havelock's concern that they are notably absent). He is correct, though, that they are not descriptive of this relationship. The translation and diagnosis phase of the problem-solving

model is an appropriate point of intersection of forcing functions. The function can also be seen in creating the awareness phase of the social interaction model. There is a tendency to become aware of forces in one's interaction field. Further, the role of forcing functions is most evident in the research, development and diffusion model if the federal government and foundations are seen as "forcing" or directing research. Thus, there is a definite place in each of the models to accommodate crisis events or forces.

Early in his work Havelock (1969) mentions that innovation and change can, and do, occur in conditions of disaster. Certainly the attempt to overcome the "force" is so strong, and risk taking fears comparatively weak that changes are more easily made. The task is to change conditions which are threatening, and because the situation "outside" the individual is in such need of attention, the individual does not have his usual "fear" of failure which is associated with changing in less hectic circumstances. Whether such changes will be permanent or temporary is discussed later in this paper.

Most innovations are generated at the national level in the view of Goldberg (1970, p. 53) and "long guarded localism loses much of its meaning." (It does not

lose its adherents, however.)

The courts, too, are change agents which force compliance to some extent. Heinich (1970) states that change forces are working on the base and the superstructure of the social system itself (p. 177). And E. Rogers (1962) in discussing "What are innovators like?" notes that there is no profit motive to be an educational innovator (p. 61). However, current legislation in California may make teachers accountable for their "outcomes"--with termination of employment the ultimate "force" for poor results. Now, that is an incentive which Rogers would not have foreseen a decade ago. So with the incentives being forced upon educators, much as James Finn noted in 1964, educators are or will be forced into second level roles. The answer to this situation is not simple in application, but can be stated fairly easily: educators must plan change in education!

From his report on the traveling seminar and conference for educational innovation, Richland observes that research should be devoted to planned change in education (1965, p. 89). For purposeful system change he recommends an alignment of state education agencies, local education agencies, and teacher preparation institutions, and

concludes that change methods are needed.

Yet, change is not necessarily progress. The distinction is a value judgment in that progress is toward measurement of movement to goals. It is a more scientific, professional judgment based on scientific knowledge and demonstrable linkages with action and results (Peter, 1966, p. 4). Value systems of the past are only resources--they cannot be guidelines--we must develop new value systems to change. Old value systems are potentially irrelevant (Ely and Chisholm, 1971). Socrates said it first, "The unexamined life is not worth living." Life must be examined for present needs and future expectations in order to plan for and implement procedures to move toward the life which is desired.

It is appropriate to view some recommendations, long-term trend projections, and an ethic of change as mentioned by several figures in the field.

Havelock (1969, pp. 11-2, 11-3) makes the following recommendations for facilitating change processes:

1. Carry out case studies which carefully document the events of change.
2. Develop another comprehensive, analytical review of the literature (e.g., Rogers, 1962).

3. Create programmatic research and development on the utilization process, such as the regional R & D laboratories would hopefully accomplish.
4. Prepare journals for research and theory on dissemination, utilization, and innovation.
5. Develop a central facility for collection, storage, and dissemination of knowledge about dissemination and utilization processes.

"Emergent change, not homeostasis, is the order of the day. The trend is toward institutionalization of the process of research-development-innovation-dissemination, and toward the development of organizational forms adapted to promoting change" (Harman, 1970, p. 6).

If change is to occur in such a way as to avoid the pitfalls of random reaction to events there must be an ethic of change--principles which guide changers. Donald A. Schon has provided a set of principles; we should (1) prize the process of discovery, (2) start where we are: reality!, (3) operate under the priority of experiment, and (4) make projective use of the past.

Certainly these recommendations, projections, and principles have value in analysis of past change methods and development of future approaches. Change, if it is

planned, requires certain procedures. Under the general field of knowledge utilization a number of researchers have worked toward a better way of using what knowledge we have and developing and finding what we need.

Knowledge Utilization, Innovation, Development

Education is changed from both internal and external pressures which require reliable knowledge for intelligent decision-making. Pellegrin (1964) discusses six methods of searching for reliable knowledge and questions the efficacy of five; the scientific method, he believes, is a system approach to planning and utilization of reliable knowledge. The systematic application of scientific knowledge in education will change the traditional approach of technology in education to technology of education. The results will aid in preventing the overhasty adoption of technology in a patchwork manner. Piecemeal change is reactive; it is changing under duress rather than under plan. Henri Dieuzeide (1972) developed the concept of technology of rather than in education in a paper in the Educational Broadcasting Review. He also discussed the need for "centers for the promotion of innovation" and parallel but separate "centers for excellence" (p. 38). Certainly

meritorious goals, but achievable. Several authors have suggested the need for centers of innovation, although they have been described with somewhat different functions, Dieuzeide's concern with parallel centers for excellence is worthy of consideration.

In 1969 Havelock and Benne described utilization of scientific knowledge as a concept of "a system" or "a process" with the conclusion that both models are needed to provide effective utilization services. A system concept sees the flow structure and administrative structure while the process concept is concerned with the motivational aspects, interpersonal and group membership issues, and technical issues (p. 126). It is evident that both approaches must be included in a generic model of knowledge utilization.

The intrinsic characteristics of knowledge utilization are described by Havelock (1969, pp. 8-38, 8-39) as (1) the scientific status of the knowledge (not as strong a factor as it might be [e.g., personal communication and economic considerations may overshadow the scientific value]), and (2) the value loading--preferences and biases --of the knowledge. Knowledge utilization, of course, cannot occur without knowledge production. And, it is in

the area of production that many questions arise: pure versus applied (practical or practice) research is the major point of disagreement.

(It is assumed that the reader will share this concept which is inherent in the writer's preparation of this paper: data yields information which yields knowledge which hopefully provides wisdom. There is a large data base which is the bulk of the so-called information explosion. Data which are processed [synthesized] yield information. Information is data which can be used for some purpose. From information selected judgments can be made which give us knowledge--a higher level abstraction which has greater value in decision-making. Finally, wisdom represents the nearest approximation to Truth, and reality coping heuristics, which man has. It is implicit in this discussion that the goal is toward the higher orders.)

Thus, as Boyan notes, in the argument of pure versus applied knowledge, there is a baseline which makes them all common: all <u>unused</u> knowledge has essentially the same characteristics. They are undeveloped, in forms not acceptable or understandable to potential users, and there is a need for preparation of users in utilization. This

condition is basic to all knowledge utilization (1969, pp. 21-22).

Bennis (1969) comments that action research (applied) no longer has the stigma it once had, the applied social science fields indicate this.

But, regardless of the type of research, the need still exists for research which provides problem-solving capabilities. Carter (1968) notes that solutions must be sought in the context in which they occur, and as a result educators should no longer use the excuse for not changing that research has not yet provided an answer. One of the more interesting approaches to this finding of answers "in the context in which they occur" is the field development proposal made by Ben H. Romine in Learning Today (1971, pp. 54-59). This model outlines a self-change strategy which is oriented about the problem-solving approach: Also, the RDAF (research, development, application, feedback) cycle of Filep and Schramm was designed to be a field method for research assessment. But, as McKeegan (1971) comments, "to expect administrators and teachers trained in atheoretical or antitheoretical methodologically oriented programs to become highly flexible evaluators and adopters

of research is to expect what cannot be" (p. 329).[1] To gain much from educational research we may have to reorient our preparation programs toward an outlook of experimentalism so that teachers and administrators will be interested in and able to use research.

Charles Jung and Ronald Lippitt (1969) have stated that knowledge utilization from research must be derived and is one of the critical needs of knowledge utilization, while Havelock (1969) describes the major unresolved issues: (1) Is social science utilization different from scientific? (2) Should we protect the purity of pure science? (3) How do we decide between humanistic and engineering approaches (freedom versus structure? (4) How do we manage competition and parallel effort versus coordination and cooperation? Although Heinich (1970) comments that parallel development may lead to shorter time between discovery (or invention) and application.

In March, 1968, a major conference was held at Michigan State University in which "Research Implications for Educational Diffusion" was the theme. The result of

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[1] (Cf., Richard Schmuck, pp. 147-156, in Eidell and Kitchel, Knowledge Production and Utilization in Educational Administration, [Eugene: University of Oregon Press, 1968].)

that conference was a series of major papers by outstanding people in the field including Richard O. Carlson, Ronald Lippitt, Ronald Havelock, Everett M. Rogers, Nemi Jaim, Nan Lin, and Richard I. Miller. The papers are presented in ERIC document 026 535, and are most worthwhile.

The development of research findings, whether "pure" or "applied" is a major need in the process of knowledge utilization. Launor F. Carter (1968) discussing Project Hindsight found that the development of research "forces" knowledge production in missing areas so that a complete outcome eventually emerges (as applied, in this case, to Defense Department work). Halmos, somewhat earlier, said that the need for scientific knowledge percolates up to the ivory tower in a few decades and the answer comes down after a few decades (1958). His comment would support the findings of Paul Mort that as much as 100 years elapses from the time of invention/discovery to the point of full adoption--the first fifty years in groping with the problem and the last fifty years in adopting/diffusing the idea. In 1968, Boyan stated that in education one of the problems facing development is that educators do not understand the importance of it, there needs to be more financial support, and pilot programs and adequate testing must be carried

out. He further suggested that development is only one hypothesis of converting knowledge and recommended that other hypotheses be considered, though he did not suggest any others.

A significant overview of the development process is made by Richard E. Schutz (1970) of the Southwest Regional Laboratory for Educational Research and Development.

A number of commercial interests have begun development of research "products" in the field of education as has been done for a number of years for the government on a contract basis (Havelock, 1968).

Pellegrin views reliable knowledge as a major force in the making of intelligent value choices through awareness of alternatives among which we might choose (1968), while Havelock (1969) comments that there is also a need to use local wisdom without pushing scientifically-based expert knowledge. In essence he is stating that the American pragmatism principle must be considered--if it works well, do not change it.

In addition to the intrinsic characteristics of knowledge and innovation, Havelock (1969) states that extrinsic factors must be considered: (1) compatibility of

innovation with the users system, and (2) the relative advantage which includes cost, both initial and continuing, and reward factors, both material and nonmaterial. As regards costs, Erick Lindman (1967) states "the cost of implementing innovations is continually a crisis." If we were to make innovations replacements for instead of additions to baseline programs the costs would not be redundant at an operational level, though there would be installation costs. It is a matter of selecting goals and implementing very selectively to accomplish them, irrespective of existing nonfunctional or dysfunctional programs. Richard I. Miller (1967) observes that the kinds of change are substitution, alteration, variation, restructuring, and value orientation. They become more complex to accomplish as values are approached.

Leo E. Persselin (1970) views education as big business, and cites these figures to illustrate it: "New York, California, and Pennsylvania all have state budgets for education which are larger than that of the U. S. Office of Education, and numerous large cities have annual educational expenditures larger than those of many states" (p. 11). Blumenthal (1969) also comments that education is big business (therefore business systems applications are

entirely relevant and necessary). He was a systems analyst and author of a book on management information systems. Finally, Malcolm Richland observes that the change process in the past has focused on content of the change rather than on the change process. The change process is implied in Havelock's linkage model and is the field of emphasis in the next section.

Linkage, Temporary Systems, Demonstration Programs, Dissemination

Permanent systems find change difficult and temporary systems are a powerful technique in facilitating innovation/change (Miles, 1964; Bandy, 1969; Havelock, 1969). Miles also notes that temporary system accomplishments can be transferred into a permanent system while Havelock finds that the "moving" phase of Problem-solving strategies is a temporary system. The advantages in using a temporary system are: (1) time limit, (2) initial goal development, (3) boundary maintenance operation, (4) physical and social isolation, and (5) size and territoriality (Miles, 1964, pp. 452-457). The traveling seminar and conference, which was a demonstration program was also a temporary system.

There seems to be a general consensus that the linking role is important (Havelock, 1969, 1968; Farr, 1969; Gallaher, 1964); Havelock (1969 and 1968) indicates that the government plays a major role in the linking role. He believes that knowledge linking is a serious and massive problem requiring heavy federal support, the federal government should be involved directly and indirectly in diffusion, and the government should be specific in defining roles it wishes to establish. Farr comments on the importance of informal networks in knowledge flow and identifies the significance of the gatekeeper function. It might be noted that the gatekeeper is frequently an informal role, which makes its presence increasingly more difficult for a formal model to include. But, there are many strategies for change which facilitate linkage in both the formal and informal networks as will be presented later in this chapter.

Quite a number of terms and descriptions have been used to describe linkers. Havelock (1969) notes the conveyor, consultant, trainer, leader, innovator, defender, and functions of knowledge builders as linkers, practitioners as linkers, and the user as a linker; Gallaher (1964) describes an advocate; Guba (1968) refers to the

need for an intermediary between knowledge production and utiliz tion, such as Western Electric is between Bell Labs and the Bell Telephone system; Mackie and Christensen (1967) proposed a learning engineer, and Carter (1968) required the equivalent of an engineer in education. Regardless of what the linker is called--and he is frequently called a change agent, as in Rogers (1962)--there must be a supply of linkers from adequate training programs. This will be discussed in detail in the section of this chapter on Education and Training--the Role of the Professional Schools. In a status report, the Far West Laboratory in Berkeley defined the role of information consultant and listed the number known and the potential number available in the United States (1970, p. 14).

In a Working Paper for the Center for Instructional Research and Curriculum Evaluation (CIRCE) at the University of Illinois, Gordon A. Hoke (1970) mentioned that linking tasks need to involve students and teachers and must evaluate the institutional climate and staff relationships. He further found networks weak or lacking and recommended a data bank and information storage and retrieval system as a key to the future capability of such a venture. Hoke (1970), and Havelock (1969) have concurred in the

marginality of most linking roles, and Havelock has added that linkers suffer from an overload condition when too many tasks are operated simultaneously (which is inherent in the function of a successful change-agent).

Jung (1967) and Havelock (1969) describe change agent roles, with Havelock suggesting that the change agent might increase awareness of pain in a system. He notes by analogy that chronic illnesses are deeply repressed and must be made acute for identification, diagnosis, and treatment (p. 8-25). The analogy is frightfully accurate, however, if the concerns of writers in the field are to be taken seriously; American education is a chronic case, burying its head deeper in the sand and becoming even more vulnerable in the process. (There is a phenomenon here which is also seen in the society at large. We react to situations aversively by voting against a candidate or proposal on a ballot instead of taking a positive action for that which we prefer. This negativism has a multiplier effect in that it permeates our actions and obligates us to turn away from any hope of self-renewal.) Havelock (1969) notes this characteristic when he discusses consumer reactions to innovations by such behaviors as nonpayment, nonadoption, control, and signs of dissatisfaction.

Backsliding to old patterns may occur if the change is not internalized warns Benne and Birnbaum (1969). All programs and routines in a system must be mated to the new program. There is a need for a long-term follow up by the change agent to (1) maintain change processes and changed programs, and (2) continually update computer files on change program successes/failures and change strategies. It must be considered that "people never adopt a process, they adapt it" (Haney, 1968). This point is made time after time as advice to change agents--they should not expect that their standards for adoption will be met exactly, for every program is changed, and often improved, by adaptation to local circumstances. In addition, a program would often fail if it were forced into an existing situation without some measure of modification. This concern will be expanded in a later section of this chapter.

The April, 1971 issue of the Journal of Secondary Education devoted the entire issue to four national innovative programs, including: ES '70: A System Approach to Educational Reform; Educational Change: A Strategy for Study and Action; NASSP Model School Project; and Project PLAN: Basic Assumptions, Implementations and Significance. Martin Olson (1971) describes APSS: A National Network for

Better Schools. Havelock (1969) and Watson (1967) describe the COPED system of educational change. And, recently, Lasmanis and Gorman (1972) described PMIS, a Planning and Management Information System, and Voegel (1971) proposes an "Innovative Diffusion Center: A Potential Concept to Accelerate Educational Change." All of these are linking approaches to educational change.

Ultimately the user should become his own linker (Havelock, 1968), although it seems that there are many advantages stated in the literature for an outside, temporary system to provide assistance. Rogers found that his Innovators often bypassed the county agent and went directly to information sources and university personnel for information on agricultural practices. Thus it must be said that no one approach will consider the variety of personalities (of individuals, and to some extent of organizations) in the adoption/change/innovation area.

The consultant-type change agent with his dyadic relationship has an advantage in being user-initiated after awareness (Havelock, 1969).

The literature is firm on the value of firsthand experience, credibility, and value of seeing a demonstration program/project in a regular school program. Past

demonstration schools and university schools were not closely enough related to the day-to-day problems of educators to be credible (Richland, 1965; Brickell, 1964; Miles, 1964). Demonstration schools in I/D/E/A are working schools with innovative programs (Howard, 1968).

Carter (1966) reports a multiple correlation of .63 for the effectiveness of the Traveling Seminar which the System Development Corporation operated. A full report of the seminar may be found in Richland (1965), where he reported that innovation at participating districts was significantly higher (at the .01 level) than in nonparticipating districts.

This observation and caveat are offered by Havelock (1969): demonstration programs are a source of feedback for planning the "phasing" of adoption strategies, and "a demonstration project that fails is a powerfully convincing argument to the adopter that the innovation should not be tried" (p. 1-15). (It may reflect badly on the change-agent, or the linking agency, or both.)

In order to create awareness of an innovation, it is necessary to disseminate information about it. The Educational Resources Information Centers (ERIC) are designed to provide such a function. Although there is

some question of their effectiveness at reaching administrators and teachers, they do provide services for researchers by computerized searches. Nevertheless, the need still exists to create awareness of programs for consideration by potential adopters. To this end, Carlson and Kiernan (1966) studied a possible communication network for the Massachusetts State Department of Education, and made the recommendation that a network should search, select, evaluate, disseminate, and demonstrate practices.

Randall L. Dahling, in a study for Stanford University's Institute for Communication Research, found nine factors in the spread of an idea through many disciplines. The factors are significant in planning dissemination efforts. There is a "best" medium for each strategy of knowledge utilization as reported by Havelock (1969, pp. 9-39, 9-40). And, Havelock and Benne (1969) developed a guide to message preparation and transmission in the dissemination effort. They list restrictions of various media, oriented mainly around the concern that rapid transmission fails to provide feedback or depth, whereas slow transmission s accurate and provides depth, but often leads to "overload" conditions. One of the reasons for considering an interactive computer system in the model in

Chapter IV is that it remedies most of the concerns expressed by Havelock and Benne. The CRT terminal, teletypewriter, facsimile, and Computer output microfilm (COM), tied in to a computer, provide feedback, speed, accuracy (low "noise"), and simulation possibilities--as needed. The advantage is described as information "pull" which is selective, rather than information "push" which is indiscriminating.

Bushnell (1970a) says that ERIC and others can spread the word systematically, while Havelock (1969) warns that media may increase awareness, but follow through is necessary for an integrated (system) approach.

Trial, Pilot Program, Evaluation

Demonstration programs provide an extremely important role in allowing a potential adopter to view a program in credible circumstances. There is little chance that an administrator would attempt to implement a program which is new to his school/district without a small scale trial. Thus, this section of the survey of the literature will discuss some of the concerns of phased adoption.

Rogers (1962) mentions that divisibility of an innovation is necessary, or at least highly important, for successful adoption. An innovation which can be tried on a

limited basis will more likely be attempted, and will more likely succeed (cf., Orlosky and Smith, 1972) cited earlier. Havelock (1969) mentions the divisibility factor adding that the complexity component is partially solved by having a phased adoption process (p. 8-41).

Evaluating the ESEA Title III programs Blaschke (1971) reported that demonstration "value" and demonstration "effect" were lumped together in decisions to continue funding of programs with the result that many programs with "effect" but low "value" were continued while far more significant programs which required time to show "effect" were eliminated before their "value could be seen (p. 137).

The need for adequate evaluation instruments and techniques is critical. Patricia Kendall (1964) has developed an evaluation methodology which negates the need for long-term evaluation to measure the "value" and "effect" of a program or project. She uses attitude questions on the effect of curriculum change and has achieved exceptional results which apparently are both valid and reliable (p. 40). Kendall notes the requirement for objectives, the advantage of testing for both long-term and short-term effects (which the classical experiment does not usually allow), and the use of a replication technique to

extend the evaluation data base to increase confidence in the results (pp. 344-360).

Egon Guba, reporting a new concern of Daniel Stufflebeam, identified four kinds of evaluation: context, input, process, and product, and argues that traditional evaluation has four characteristics which sharply limit its utility: terminal availability of data, retrospective view, imposition of constraints, and limited generalizability (Guba, 1968, pp. 56-62).

The Cooperative Educational Research Laboratory in Illinois has developed a taxonomy of programmatic tasks for educational evaluation which provides 179 criteria for developing a system, a recommendation for a national agency on evaluation data, and a comment by Stufflebeam:

> The purpose of this part, the reporting part of a design, is to insure that decision-makers will have timely access to the information they need and will receive it in a manner and form that facilitates their use of the information. (ED 035 975, p. 23)

Diffusion, Adoption, Implementation

The diffusion of improved school practices is the primary focus of those interested in betterment of education. Diffusion implies multiple adoptions throughout a population. Yet diffusion is built upon adoption of

practices by individuals within organizations, by organizations, themselves (consisting, nonetheless, of collectivities of individuals), and by larger structures, such as a state education agency. In a temporal frame, then, adoption precedes diffusion.

The first major thrust in the area of diffusion studies was made by Paul H. Mort (1941) at Columbia University. His study showed that up to 100 years were required to go from discovery/invention to application throughout a population. The first fifty years is spent in groping with the "pure" findings and in developing them to an extent that adoption by practicing units is feasible. The next fifty years is spent as follows: fifteen years are required for the first 3 per cent to adopt the idea, twenty years is required for the adoption level to reach 85 per cent (this is the period of most rapid growth), and the final fifteen years finds the balance of the population adopting (98-100 per cent). Ross (1951) supported these findings in a study of seventy cases.

The first significant indication that these rates could be increased was indicated by Brickell (1961) in a study of New York schools. Brickell (1961) and Cawelti (1968) indicate a cause-effect relationship between the

diffusion rates as a result of the Russian launching of Sputnik in 1957. The National Defense Education Act was passed in 1958 and provided a significant impetus to change in the schools. The forcing function effect appears to be viable, as attitudes in this perceived crisis were easily changed toward school innovativeness.

Cawelti (1968) indicates a number of factors which act to facilitate change (per pupil expenditure, type of community, and enrollment). Carlson (1964a) also described factors which affected innovation adoption by plotting an adoption curve based on interaction and status of superintendents in Pennsylvania. He found that personal characteristics of the superintendent were important effects, and education does not appear to be fundamentally different from other fields in its rates of diffusion. Perhaps education comes under such vocal criticism because it is so visible to the community. There is daily interaction of the children in the schools with the parents and other community members.

Havelock (1969) distinguishes between an "adoption curve" which shows the rate of adoption (an "s" curve), and the "diffusion curve" which shows group rate of adoption (and is shown as a bell shaped curve by Rogers [1962] to

illustrate the number of people who adopt in a given time frame, or as an "s" curve to show cumulative adoptions).

Schmuck (1968) makes a point that there may be "plateaus" in progress of an adoption, but these should not be a major concern of the change agent as they may only represent the equivalent of learning curve plateaus.

There are a number of barriers and facilitators in the change process as noted by R. I. Miller (1967), Watson (1969), Havelock (1968, 1969), Clinton and House (1970), Lippitt (1967), Carlson (1964), Miles (1967), Hearn (1969). The value of a "force-field" analysis is mentioned by Watson (1969), and Lippitt (1967), as a means of facilitating adoption through awareness of forces for and against the change, and to determine ways to reduce the resistive forces. Barriers to change may be institutional (Havelock, 1969), or personal (Watson, 1969; Miller, 1967).

There are certain organizational characteristics which Havelock points out may act as "shells to filter" communications (1969, p. 6-6).

In a paper presented at the American Educational Research Association, March 1970, Clinton comments on the "value" of the innovation to the adopter is a factor in acceptance. He upheld Rogers' characteristics of

innovation in his study, and emphasized the perceptions of the teacher as being very important (Clinton, 1970).

One role which inhibits innovation adoptions has been given slight attention, but is a significant factor--the Defender! Havelock (1969) points to the defender role as providing significant advantages in spite of the tendency of change agents to view such activities as obstructive. The transmission of negative information is one characteristic of the defender which may prove extremely valuable to the local unit in that it may prevent change before irreversible risks are encountered (Havelock, 1968, pp. 82-84).

The lack of a change agent, a weak knowledge base, and the "domestication" of the public schools were cited by Carlson (1964, pp. 4-7) as being important barriers to change in public schools.

Miles (1967) presents a strong case for the low interdependence in schools as a factor in inhibiting change. A change in one part of a school (e.g., a classroom teacher's practices) may have little or no effect on other teachers' behaviors because of the low interdependence and attempted autonomy of classroom teachers. This is particularly evident as subject matter becomes more

important (witness the low degree of innovation in colleges compared to elementary schools). In this same vein Watson notes that local adoption is easily facilitated, but system-wide diffusion is nearly impossible--again due to the low interdependence factor (p. 17).

Apparently there is a large measure of optimism necessary to want to change schools, and to want to be a change agent, for the literature on change abounds with how to accomplish change; very little of it discusses the factors of rejection and discontinuance. Rogers (1962) provided a framework to analyze discontinuance at several points in the diffusion/adoption continuum, but it has not been picked up in large measure by the researchers. Eichholz and Rogers (1964) again comment that rejection is a concept not often considered in the research, and provide a rejection process chart to illustrate a proposed rejection theory (p. 305). They further note that rejection reasons are both "real" and "stated"--a principle noted in the general literature of psychology, social psychology, and sociology.

In a paper presented to the American Sociological Association, Gross, Giacquinta, and Bernstein (1971) describe change failure due to (1) management's failure to

anticipate the problems which the teachers encountered and the lack of feedback mechanisms which made it impossible to deal with these problems as they arose, (2) failure to modify existing practices, (3) the teacher's inability to carry out their new roles due to lack of understanding and inadequately developed skills, and (4) a growing frustration on the part of teachers as they became aware of their inability to handle situations in the prescribed manner.

Change failure, also called rejection, discontinuance, and termination, is mentioned by Rogers (1962) as the saturation point reached in the "interaction effect" which causes "diffusion termination" (a slow down and cessation of activity). Leuthold and Wilkening (1969) note that this termination is caused by social isolation, variation in applicability of the innovation, and obsolescence of the innovation before full adoption is reached.

In a major study of the ESEA Title III programs, Norman E. Hearn (1969) studied continuance of Title III programs after their funding was ceased by the contract under which they were installed. He found six criteria which innovations must successfully meet to be adopted, and found, too, that discontinued projects were not "highly visible" (p. 155). Community climate, cost of innovation,

size of enrollment, administrative actions, and other variables were analyzed to determine the ability (and interest) of a district to continue programs after federal funding was terminated. The amount of money which a district contributed to the innovation effort was noted as being important to continuation of programs, it seemed to be a good indicator of commitment.

Adoption Strategies

The value of strategies in adoption of innovations is hardly questioned, unless the challenge that strategies, like behavior modification, represent some odious factor to be inhibited is considered. Quite a number of strategies have been included in the literature, but one of the most concise paradigms of strategies is presented by Bennis, Benne, and Chin (1969), when they identify the (1) empirical-rational, (2) normative-reeducative, and (3) the power-coercive. The advantages and concerns of each of these is discussed and they conclude with a chart of the types of strategies used by each major proponent of change.

Regarding change strategies, Schein (1961) observed that there is no evidence to prove that any change strategy provides permanent effects. He continues that the power

strategy may force a change in the individual's behavior, but that attitude change need not follow. He follows a Lewinian force-field approach by continuing that if an "unfreezing" operation is undertaken while behavioral changes are being coerced the individual may have to learn new attitudes to justify his behavior and that these new attitudes may then "freeze" into new behaviors. This is supported by Festinger's cognitive dissonance theory: counter-attitudinal role playing will result in consistency-producing attitude change and maintenance of coerced behaviors. Sayles (1962) states that "conversion" is often used in affecting social system and organizational change. It is a persuasion and influence approach to change, which Walton (1969) finds effective for long-range change.

The rational man, cooperator, and powerless participant strategies are defined by Seiber (1968) and he observes that each of them fails in some way. Thus, he proposes a change strategy of the Status-Occupant. It is imbedded in an intricate network of role relationships and involves strategic planning by top level management.

Schmuck (1968) finds certain socio-psychological factors will enhance the practice of research knowledge, including simulation techniques, staff involvement, and

administrative training for feedback and flexibility.

To effect deliberate change from within, Schon (1967, pp. 125-131) recommends that leverage at the top, perception of crisis, conflict, sufficient time, and a vision and a model are all necessary considerations.

Havelock (1968) comments on the leadership role and process in defining the gatekeeper and opinion leader as persons to be utilized and considered. These functions tend to be person rather than position oriented, thus they are informal and not formal. Informal relationships are not always considered in formal models, yet they are the basis for communication networks which can make or break a change effort.

People-oriented change strategies are discussed in some detail by Kurland (1972), Benne and Birnbaum (1969), Miles (1964), and Bennis (1969).

Norman Hearn discusses "The Where, When, and How of Trying Innovations," (1972) in which he describes a number of strategies from his several years in successfully assisting change efforts. Carter (1968) expressed the need for knowledge, yet found a greater need for a strategy for bringing together the necessary resources to facilitate use of knowledge.

Goodwin Watson (1966) says that innovations can be made applicable to any social system of any size! He then defines a phased approach to change, advocates a system approach to definition of the change needed, and recommends a force-field analysis as part of the strategy. Perhaps his exclamatory comment is not too far afield.

In a similar manner Miles (1964) declares that change processes must be studied and strategies for change derived therefrom. He outlines a 16-cell strategy which describes changes initiated either within or outside the system, using new or existing structures, going through four phases--Design, Local awareness-interest, Local evaluation, and Local trial. He is emphatic that for any one of these strategies to succeed all four steps should be followed. Havelock, too, was concerned about phases of change in the strategy of change when he commented that problems are "skipping phases," "being out-of-phase," "obsession" and "compulsion" about phases (1969, pp. 10-86 to 10-88).

Most change strategies are concerned with the internal steps only. Scanlon and Brown (1971) observe the need for change strategies which include teacher and administrator training (or retraining?), a data network/ feedback system, and criteria to ensure commitment to

change. It was mentioned earlier in Hearn's study (1969) that a commitment is important in continuation of an innovation.

Inadequacies of past change strategies are outlined by Dionne (1970) with the failure of the superintendent's leadership, of the grass-roots approach, and of the demonstration approach. Bushnell (1972) identifies causes of past change failure and suggests a review of successful strategies and unsuccessful ones with the recommendation that effective strategies will utilize the system approach. Blaschke (1971) finds that incentives to change are notably lacking in education and the federal government strategies to effect change have not been overly successful to date. He recommends that change strategies contain objectives, participatory planning and decision-making, a method of dealing with the NIH (not-invented-here) factor, and some consideration of contingency planning.

Participatory planning in education, because of the vulnerability of public schools, involves including both professional staff and the community. The importance of and strategies for community involvement have been mentioned extensively (Miles, 1967; Hoke, Basile, and Whiting, 1971; Fessler, 1967; Havelock, 1969; Pilecki, 1971; Mackenzie,

1964; and Kimbrough, 1970).

Havelock (1969) finds pre-exposure to concepts of change ("sensitizing") is a valuable approach, and also recommends a needs assessment to include the superintendent, principal, teachers, students, and community.

Administrators frequently withdraw from a "confrontation" with the community to which Pilecki (1971) states, "the involvement of the community in the operation of the schools should not be decided on the basis of risk. Rather it is an imperative process necessary to strengthen the educational program . . . " (p. 29). Mackenzie (1964) describes cultural context factors to be considered. He also finds ten major groups internally, and six categories externally which should be participants in change. In addition, there are sources of power and methods used by participants, such as prestige, competence, money or goods, legal authority, policy, precedent or custom, and cooperation or collaboration.

Finally Kimbrough suggests using political strategies for change and asserts "effective interaction . . . with community influentials in the power system" is essential to effect change (1970, p. 79).

George Gallup's Third Annual Poll for Phi Delta Kappa provides valuable insights into the change process and the local attitude. An extrapolation of his poll indicates that attitudes toward innovation in schools are not negative. There does not appear to be any dramatic hostility toward innovation, and there is mild support. It seems that community involvement in planning would increase support for schools and educational practices. (See Phi Delta Kappan 53[1], September, 1971, pp. 40-50.)

Group Processes, Communication

"A person learns significantly only those things which he perceives as being involved in the maintenance of or enhancement of the structure of the self" (Carl Rogers, 1971). "Involving people in change may be the greatest innovation of all" (Michael, 1967). Group processes and the communication which they entail has been shown to be a major force in attitude and behavior change. (It is such results that have been partly responsible for the hue and cry of certain factors regarding "sensitivity training" and "T-groups" although the popular use of such techniques has not always met the professional use.) Nonetheless, the need for participant involvement has been noted throughout

the change field (Havelock, 1969; Lacey and Furbay, 1971; Lippitt, 1965; Barber and Rock, 1969; Argyris, 1962; Schon, 1967; Giammatteo, 1969; and Gallaher, 1964).

In discussing the collaboration strategy (Bennis, Benne, and Chin, 1969) stated that the more transactional the influence, the more durable and genuine the change. Franklin and Franklin (1967) described seven "Cs" of a collaboration-integration strategy sponsored by the National Training Laboratory, and Dinkmeyer (1971) listed eight "Cs" in a "C-Group" strategy which begins with collaboration and concludes with commitment.

Other techniques for effecting attitude change and commitment to different behaviors include, "the confrontation meeting" (Beckhard, 1969) which contains six phases or steps, the force-field technique which has been mentioned earlier, but is outlined very well by Giammatteo (1969), and the T-group (Havelock, 1969) which is still quite effective in spite of a rash of criticism the past few years.

Havelock (1969, p. 4-26) describes a number of studies on attitude change, among which is an excellent survey by Arthur Cohen, Attitude Change and Social Influence (1962). Kelman (1969) found three processes of social

influence: compliance, identification, and internalization. Lippitt (1965) states that with the help of professional guidance, change will evolve from a purposeful decision to effect improvement in a personality or social system (Emphasis mine).

A sense of security is required for change; it comes from membership roles and self-identity as one who believes in certain things (Schon, 1967). There must also be an expectation of change which is shared by members of the target system because security is often low and requires accommodation in strategies (Gallaher, 1964). The use of one's self-esteem is integral in facilitating adoption: the role of the administrator is to act as a catalyst in implementing programs (Havelock, 1969).

Those who must effect change should be involved in the preparation of policies and decision-making to implement it. This has been a basic premise of this section of the literature review. To this end, the British have instituted teacher centers. "Effective change comes from teachers, not from their critics or superiors" (Bailey, 1971, p. 146).

> The underlying rationale for teachers' centers may be stated succinctly in terms of three interlocking propositions: 1) Fundamental educational reform will

> come only through those charged with the basic educational responsibility; to wit, the teachers; 2) teachers are unlikely to change their ways of doing things just because imperious, theoretical reformers--whether successions of Rickovers or Illiches or high-powered R & D missionaries from central educational systems--tell them to shape up; 3) teachers will take reform seriously only when they are responsible for defining their own educational problems, delineating their own needs, and receiving help on their own terms and turf. (Bailey, 1971, p. 146)

Professional Preparation and Training

The Professional School of Education has presented both pre-service and in-service programs for educators since the late 1800s in this country. Yet, it seems evident that the conservatism of the professional school and its marginal position (as noted earlier by Havelock) are detracting from the potential of the school as a change agent. Havelock believes that the professional school can be a change agent between the academic community and the outside community (1969, pp. 3-20 to 3-22). The professional school currently provides training for teachers, administrators, and a variety of other professionals, but it does not provide for a change agent on a widespread basis. The Far West Laboratory (Berkeley) has indicated that there is a need to train change agents (Far West Laboratory, 1970). Earlier Jung (1967) defined the

background and education requirements of the trainer-change agent.

But, to be effective, educational practices require more than just a structural change in the organization in which they occur. There must be a change in the function of the teachers and administrators. Goldhammer (1968) declares that decision-making and computer technology will have an effect on administrators and the need for their training in these techniques. There is a need for in-service education at all levels, and past educational endeavors have been to "socialize" and be satisfied with the status quo (pp. 183-184). Newer training programs must be concerned with where education is going and how it will get there through the training of all levels of educators in the skills needed to be effective in the processes of change. Such skills have been defined throughout the preceding pages, and additional ones are defined in sections to follow on Management and Administration.

Medical education (certainly defined as a professional field) has found that in-service training is more important than pre-service training (Tope, 1964). Both Havelock and Benne (1969) and Schmuck (1968) have identified the need for administrator training to be in closer harmony

with the values necessary in new administrative practices (e.g., more openness, greater participation of staff, and community). This could be done as pre-service training now, and as in-service retraining for those in the field. Havelock and Benne (1969, pp. 132-133) state that administrators need to be trained in change strategies (so that they may better utilize the services of the computer-based information system which will aid them in decision-making, planning and operations, and in selection of innovations and strategies to implement them).

The preparation of teachers is equally significant but for a different reason. Administrators must select change strategies and work with others in the selection of the changes themselves, but the teacher must implement the curricular changes--a task which they are often woefully unprepared to do at the present (Heinich, 1970). As Heinich notes, teacher content knowledge is often outdated under the older paradigm (presented in his paper) which required certain curricular changes to go to a mediated approach, as was seen in the PSSC adoptions. Teachers are going into classrooms not knowing the changes which have occurred and are occurring: the disjuncture between training and reality may be a calamity. Both pre-service and

in-service education need to consider the dilemma.

Frances R. Link (1971) flatly asserts that teacher education must be a part of any curriculum change process. The various levels and kinds of innovations would affect the extent of involvement, but involvement must be systematically considered for changes in curriculum as a routine matter.

The Com-Field Teacher Education Program developed by the Northwest Regional Laboratory takes such a view of the interrelatedness of teacher education and curriculum. The RUPS Model discussed by Jung (1968) includes teachers and the whole staff in a system approach to curriculum development. Shalock and Hale (1968) working on the Com-Field Model also discussed the components of a management system with special attention to decision processes and adaptation to and by existing resources in institutions. The system which they describe definitely requires administrator training in the techniques of group processes and decision-making.

Management and Administration

Theory, Decision-making, Organization

The educational administrator does not consider himself a businessman in the same sense that a member of the business or industrial community does. In fact, he may resent the "product" orientation of his board, and certainly of the legislation which has recently been enacted that requires "accountability" for the outcome of the education institution. But resentment does not change the fact that school bonds have not been passing as they should and legislatures are not voting appropriations as they have, and it is this concern for accountability which seems to be at the heart of the problem. Thus educators--administrators, teachers, and other professional personnel--must prepare to operate a different institution, in a different way, and with a better "outcome." To that task this review will look to the literature on administration and organization for ideas which will enhance the effectiveness and the efficiency of the educational establishment.

One of the more exciting aspects of educational administration is the opportunity to establish a climate of creativity and innovativeness in which individuals can

realize their own potential and further the effectiveness of the organization simultaneously. Recently, D. W. Livingstone of the Ontario Institute for Studies in Education, presented a paper on organizational innovativeness. In it he discussed several factors in innovativeness which the organization could provide. His findings included: internal growth provided somewhat more innovations; boundary spanning provided innovations; a loosely integrated work structure provided low scope innovations (loosely integrated is virtually synonymous with low interdependence which is so characteristic of educational structure); complex organizational activity structure provided many innovation proposals, but with lower adoptions; diffuse organizational goals showed higher innovativeness; whereas, centralization of control allowed for fewer innovations (1970, 50 pp.).

Along similar lines of inquiry Dauw (1969) described the creative person in organizations in an attempt to bridge the creativity-innovation gap. He defines invention as an individual creative act and innovation as an organizational, cooperative, group action. What needs to be done is to develop approaches for creative individuals to yield innovations in organizations.

Innovation is an organizational tool for growth, and may be better accomplished by creativity in the organization than by a change agent (pp. 88-89).

The title of an article by A. Renee Le Roy is most insightful: "Innovation--A Continuum Not an Event" (1965). The title implies the organizational climate necessary for continuous renewal through innovation. When innovation is considered as "a thing we must do, someday," that someday usually never arrives. Truly innovation is a way of life, of adapting to conditions through being sensitive to them, to others, and to the conditions in which the really valued life is lived. And, such an approach requires a structure and function of organizations which is quite unlike the typical condition to be found in contemporary education.

Doak (1970) writes about the organizational climate as a prelude to change while Mangione (1970) is concerned with bringing perspective to the change situation. John Gardner (1963) advises that systems must meet human needs and it is individuals who create change, yet society creates complex organizational structures which might inhibit that change. He admonishes that organizations must not threaten the freedom and dignity of the individual. In alignment with this focus on the individual and his

creativity-innovativeness potential, Havelock (1969) recommends release time and financial support or supplements for the innovators in schools.

Jung, Fox, and Lippitt (1967) found that hierarchical structure provided for more effective adoption, while a more diffuse structure enhanced innovativeness: identical findings were produced by Livingstone in 1970 (cited earlier). Jung, Fox, and Lippitt also noticed that a supporting principal enhanced innovation when principals and colleagues were facilitators of innovativeness. They recommended that an "educational forum" be provided in which ideas could be aired in a spirit of openness (1967, pp. 89-90).

Teachers have a major influence on the success of innovations as noted by Gallaher (1964), Chesler and Fox (1967), and Dinkmeyer (1964). Mechling (1969) in a study of science curriculum adoption among elementary school teachers found that teachers with high dogmatism scores on the Rokeach scale had noticeably lower adoption rates than other teachers with lower scores.

The role of the superintendent has been extensively studied (Miles, 1965; Flanagan, 1970; Estes, 1966; Gallaher, 1964; Carlson, 1964; Demeter, 1951; Conant, 1964; and

Zander, 1950). The superintendent's roles are (1) content initiator, (2) process initiator, (3) mediator, and (4) squasher (Miles, 1965); while Flanagan defines his behaviors as (1) selecting, (2) installing, (3) evaluating, (4) extending, and (5) improving, educational innovations (1970).

> Though it is true that a school system as a whole accepts or rejects innovations, the school superintendent is at the focal point in the decision process regarding innovations. Whether he convinces his staff or is convinced by them, the superintendent is in a position to make the final decision. (Carlson, 1964, pp. 10-11)

The Bureau of Research of the U.S.O.E. provided funds for a study by Roger L. Reynoldson in which he studied the interrelationships between the decision-making process and the innovativeness of public schools. He found that administration leadership style and personality, and the communication network overshadow the organizational decision-making structure (1969, p. 40). This same observation has been a part of the social science literature for years--informal communications are frequently more powerful than formal ones. Reynoldson also encouraged the participation of teachers in the decision-making process.

Writers in the field of business management have a contribution to make to the understanding of basic

processes. Schon (1967) discusses leadership styles and notes that when a leader has a vision of his style he produces a need in the organization which, when he is gone, can only be filled by another "Great Man." He sketches a man with a vision of change, trust, shared development and shared risk; the resource builder-educator approach. This person is great because he creates a structure and function which lasts beyond him--a realization which is usually never made by the great man! His greatness is dependent totally upon himself and dies when he does.

Not only must organizations change their structure for innovations to be facilitated, but in some cases innovations have organizational consequences which were not planned. Seiber (1968) states that these consequences must be considered in any development of a taxonomy of innovations. Superficial changes (in terms of the organizational structure) are easily made, but fundamental changes may be disruptive. Those which are disruptive and the disruption is not planned for are usually eliminated before they succeed, leaving the expected bad feeling toward change. Schon (1971), in a book Beyond the Stable State makes a point of the "dynamic conservatism" of organizations: they fight to remain the same. The counterpart to this is

Lewin's concept of "dynamic equilibrium" in which change is accomplished through a study of the force-fields in an organization to effect nonthreatening change. Yet the distinction is great--for one does change, the other fights for stability.

The COPED Project Final Report edited by Dale G. Lake (1968), delineates a number of organizational change approaches (7), and describes a number of process variables in change (7). The essence of the findings is that organizational changes must occur to meet new needs for different functions; self-renewal occurs when people and organizations change.

The reorganization of the school is outlined by Heathers (1971) and Twist (1971) although Heathers also separately identifies the classroom as needing attention. Wayland (1964) views the school characteristics which affect innovation in this manner: it is difficult to innovate in schools, the role of the administrator is to control resources and system problems, subject matter oriented teachers are less tolerant of system demands, and a greater division of labor makes higher demands on the system (pp. 612-613).

The concerns for managing innovations are both

stated and real, and recently the Office of Education requested a bibliography on the subject from Philip Piele (Director of the ERIC Clearinghouse on Educational Administration) which was published in 1970. It is an excellent overview of the writings on "extent of adoption," "facilitators and inhibitors of change," "administrators as change agents," and "strategies for innovation." (Available from ERIC, ED 043 116).

There are measurable characteristics of a school district which empirically relate to innovative behavior of the district according to Malcolm Richland (1968) in his Ph.D. dissertation at the University of Southern California. "Urbanity," which is "high" school-density, he found to be correlated with innovativeness. The strongest correlation in his study was with the highest teacher salary, although other factors included attitude of the school board, ambition of the superintendent, and the number of years as superintendent (although this was a low correlation). He further developed a framework to predict probability of success of innovations based upon collection and analysis of data to provide a probability measure.

At the American Educational Research Association, Johnson and Marcum (1969) presented results of a study

which indicated that highly innovative school districts had an open climate, spent more per child, had younger staffs who remained a fewer number of years, and the larger schools were more innovative (as a rule).

The characteristics of an "open" system (which have been mentioned a number of times thus far) are: it has inputs and outputs, a steady state, self-regulating, equifinality (equal outcomes with unequal inputs), dynamic interplay of sub-systems, feedback, and progressive segregation (hierarchically ordered subordinate systems) as reported by Griffiths (1964).

Coordination (management) is a key process (Havelock, 1968), "choice" schemes (decision-making) are lacking to decide among alternatives (Pfeiffer, 1968). Blake and Mouton (1969) present the Managerial Grid, which is quite well known in business management, as an answer to some of the difficulties presented above. Their grid is a matrix which overlays the ideal system (a 9,9 on the grid) with the actual system to identify where and how to develop a self-renewing system.

Gallaher identifies the difficulty of managing, and looks at the sources of authority (legitimate, formal sanctions, and informal relationships) and provides an insight

into the "service" orientation and role of professional educators and their "client" system, with a recommendation for a formal "advocate" function to ease the balancing role which an administrator must play if he is to be both an administrator and change agent (Gallaher, 1965). Essentially, it is not possible to be in both roles simultaneously.

Donald W. Michael succinctly puts it:

> . . . it looks like both Eastern and Western cultures are designed to screen out innovations of the sort that would be needed to manage humanely a huge world of men and machines, but of limited resources.
>
> If we are to find a way out, it will require that we come to value highly the application of new knowledge about men and institutions. We are developing some technology that facilitates knowledge utilization but for the most part we simply know better than we did how little we know about such a technology. This technology needs to be applied to changing institutions and organizations so that they can effectively meet the changed conditions that render them inadequate; so that they can do long-range planning; and so that they--the men in them--can easily embrace error and quickly learn therefrom. We now have the beginnings of a technology for changing organizations--but only a beginning. And we need to develop a technology for designing institutions and organizations that can respond effectively and humanely to the turbulent environment I described earlier. With regard to this requirement, we do not have even the beginnings of such a technology: We are only beginning to develop the theory. (1970, p. 29)

Earlier Chin described the need for a theory of changing, instead of the existing theory of change which is so often described. Michael clearly delineates the need in

his broader assault on social change needs.

It is not uncommon to refer to the health of a person, it is done daily when the usual "How are you?" is exchanged between persons. In that case it may only be a formality, and, in fact, one would probably be surprised if he received an honest reply. But organizational health is a far more serious matter, and unfortunately one which is seldom discussed or even considered. An earlier comment alluded to the "health" of organizations when it was noted that schools are often "chronically" cautious of their failings, having them so deeply repressed that awareness of the issues has ceased. At that time it was suggested that one of the roles of the change agent was to help organizations to be aware of their ailments so that in the acute state, they could be diagnosed and treated. In "Toward a Conceptualization of Leadership for Changing," Robinson (1970) asserts that "when an organization wants to move from an already healthy state to an even healthier one, difficulties may arise from ignorance rather than defensiveness" (p. 135). His admonition is to increase awareness on the part of administrators that all resistance is not due to defiance or malice, but that change requires leadership which includes the educative function.

The state of health of an organization is one of the strongest indicators of change as Miles (1964a) views it. He proposes ten dimensions of organizational health, and seven dimensions of educational organizations which make them unique (and potentially unhealthy since several of the unique characteristics of educators are in contra-distinction to those which indicate healthiness). If his observations are valid, it makes an exceptionally strong case for reorganizing organizational structures in education. This is certainly noted in a variety of contemporary writings by Silberman, Holt, and Friedenberg, among others.

New Corporate Forms are possible as traced by Schon (1967). He sees a change in organizations from hierarchical structures to centralistic ones. (With technology in education as it is, especially considering Heinich's incipient paradigm change, educational structures will likely change to functions of expertise instead of levels of authority.)

To the reader who may be particularly interested in organization structures and the models of such, George Rice (1971) covers the historical perspective and quite a variety of structures with comments about the respective functions each engenders, in Conceptual Models of Organizations.

Again, and as usual, Heinich states it so well when he declares "management systems are formal theories which relate well developed applied substantive fields within a complex organizational whole" (1970, p. 106).

The System Approach

The System Concept

The California State Department of Education held a conference for Educational Technology Leadership personnel in August, 1971. One of the speakers at that conference was Stanley Peterfreund speaking on "Educational Change and People as Change Agents." A transcription of his summary is presented below.

> I think what's lacking at this stage in the evolution of public education, as we have observed it in the United States, is the developing yet of a systems concept. Too much is concerned with parts--particular programs, particular technologies, or specific features of curriculum--rather than the whole of the system and how its components can usefully work together and reinforce each other. The public school education establishment is often pictured as a closed society, resistant to help from the outside; protective, defensive, anti-business to boot; but I think our findings contradict each of these points. While I think there is still a great deal of resistance to evaluation from the outside, we find virtually everywhere we have gone a rising tide of introspective review and a consistently high degree of willingness to welcome help, whether it be from government, business, or whatever. Not that educators want to be told how to do their job, or be overrun by do-gooders, but offer them a partner-

> ship, find appropriate, worthwhile ventures on which to team up, and the help is gratefully received. . . . And I think at this point we are ready to say that resistance to change is no greater in public school education than it is in many other organizations and institutions we have studied, and indeed, it may be less at this point. The need to change is broadly accepted. It is how to successfully manage change that is the real dilemma! [Emphasis mine]. (Peterfreund, 1971)

From a study of twenty-five districts, which included a three-year follow-up study, Peterfreund and Associates established seven prerequisites to change. Although the findings are not described in quantified terms, there are several components which are of interest. They found a need for: (1) formal goals; (2) a strong superintendent (highly important); (3) effective principals and school level leadership; (4) management, organization, and systems; (5) good teachers; (6) financial astuteness; and (7) the status quo must never be accepted at face value (Peterfreund, 1971).

He also provides comments on the need for management and systems which are particularly pertinent to educators. Specifically, the span of control for superintendents or principals is too extensive for effective management in most districts; many districts had no formal organization; the failure of change often occurs when the principal fails to involve teachers in planning and design,

early enough in the program; and the resourcefulness of the board in securing funds and of the administration in using funds is of critical importance. The sample is limited, though it is said to be representative. If, in fact, his findings are applicable to the larger educational establishment, the need for a comprehensive, system approach is self-evident.

John F. O'Toole of the System Development Corporation critiqued our lack of a system approach with his comment:

> For too long I am afraid, we educators have looked at our educational system as a self-sufficient total system, quite autonomous and independent of other important and related systems. As a result education has not anticipated the scientific, economic, or social needs of the society in which it operates and to which it contributes. . . . An educational system is not a self-contained system. It interacts with the larger system of which it is a part . . . (O'Toole, 1964, p. 5)

For a comprehensive view of the purpose, scope, and application of the system approach to education, see Roger Kaufman's article, "A System Approach to Education: Derivation and Definition," appearing in the Audio Visual Communication Review, Winter 1968. He describes system analysis and synthesis for educational applications most helpfully.

Information Systems

The intent of an information system is to synthesize data and provide it, as information, to the user: a manager, researcher, student, et cetera. Computer-based information systems have particular capabilities to enhance the limitations of humans--as was mentioned earlier in this chapter.

Information systems are oriented around one of four approaches; depth, instructional, consultative, and current awareness (Paisley, 1970). The main emphasis of this section will be with management information systems which utilize the consultative and current awareness files most frequently.

Lorsch and Lawrence (1969) mention that cursory diagnosis of problems is a significant problem in organizations, and recommend management information systems as a way to provide the necessary thoroughness. Guidelines for such a system are provided by Whittenburg and Schumacher (1969).. Knezevich (1969) provides an overview of system analysis and its relationship to educational planning as does Monroe (1969) who also provides a model for program development. The entire issue of Thrust: for Educational Leadership 1(2) (1972), a publication of the Association of

California School Administrators, is devoted to the use of a system approach for leadership. Articles cover Project Management, Needs Assessment, Decision-making and district experiences with the Project Leadership approach. In all, it serves a valuable purpose in exposing the "firing line" administrator to alternative approaches to school management.

Vital Speeches published an article by Myron Tribus on "The Software of Change" in which he described the benefits of working with a computer-information system on clear thinking and thoroughness in viewing a task. He critiques management-by-exception which is a common method of "error reporting" found in industry, but finds value in the use of management information theory in helping the administrator to realize information transmission characteristics such as channel capacity, and overload (1969, p. 14).

Pilecki (1970) defines systems and describes the uses of the system perspective and leadership in educational organizations.

By studying nearly 400 school administrators, teachers, and support personnel, Chorness, Rittenhouse and Heald (1969) and Rittenhouse (1971) analyzed the use of information systems on the decision-making process.

One-third of their respondents reported information inadequacies as a most critical aspect of decision-making. The proliferation of management roles in education is making the use of an information system even more critical. The findings on perceptions of several components of the educational hierarchy regarding who is responsible for innovation are worth the time to study.

A survey of the utility of information systems, PPBS, and the decision-making and analysis considerations is provided by Cleland and King (1968).

In describing the function of an information system Evans (1970) says educational management information " . . . acquires data from the educational system and the society, and manages these data in such a way as to make them useful. That is it converts the data into information . . . " (pp. 258-259). The conversion process leads to the danger that the information system may "filter" data too much (Gardner, 1963), although a well designed system will provide enough for accuracy and not so much as to cause overload.

Corrigan (1969) finds the objective of a management program is achievement of planned outcomes, and methods-means selection is a device to accomplish this objective.

And Gardner (1963) warns that the goals-means tragedy is that methods become more important than goals. One of the values of a comprehensive model is that it places this dichotomy in perspective so that the system serves the goals rather than to have the system determine alternatives.

Decision-making as a process is discussed by Alkin and Bruno (1970), Havelock (1969), McMillan and Gonzalez (1968) and Evans (1970). They all agree that in administration, decision-making is critical. Havelock makes a point that " . . . administrators will make decisions with or without facts" (1969, p. 8-10). The literature is abundant with the intuitive nature of much decision-making--a condition which does not bode well for the purposive, objective-oriented decision making which is the heart of "good" decisions.

Applied decision theory is called operations research (Brightman, 1971, p. 50). The models used in operations research and decision-making are intended to increase predictability of outcomes. Brightman also offers a warning that the quality of decision coming from an administrator is based on the quality of the information put into the system and there are value limits of OR decision-making. (Garbage in, garbage out [GIGO] is an

axiom of personnel in management information systems.)

There is a need for a national data bank and for relevant models to aid in simulations for projections of future operations according to Evans (1970). He also notes that MIS (management information systems) in education allow for fast response, can be interactive, and allow for informed rather than intuitive decisions.

Alkin and Duff (1969) identify data problems in systems research: (1) specifying objectives, (2) incomparable data elements--differing instruments, (3) incomparable data elements--differing concepts, and (4) missing data. In developing an information system Coney (1968) recommends consideration of constraints, assumptions, guidelines, criteria, utilization methods, and information gathering: he also suggests a sample information model with alternative applications of the concepts.

One major reason for lack of consideration or rejection of a management information system is cited as the cost. Districts have been developing consortia to overcome this and to provide an adequate data base upon which to evaluate the system. Blumenthal (1969) recommended that the real cost of an information system is not that incurred to develop it, but that incurred by not having the

information produced by it!!! He notes, "large man-machine systems are traditionally costly and difficult to change . . . often the man part is as difficult to change as the machine part. Many executives at or near the apex of the man part are doomed to failure in a dynamic growth situation because of the inability to adapt" (p. 196). Weiss has found that the interactive use of a computer is inhibited by a resistance by management to use any keyboard instrument, such as a data terminal or teletypewriter. Yet, the interactive use is one of the most powerful and promising methods of decision-making in the spectrum of management information systems (1970, pp. 311-312).

With the capability offered by a system approach and by system analysis and synthesis for education, why has it fared no better than it has? Don Bushnell (1971, pp. 8-9) has found: accrediting agencies focus is not on inputs and outputs of the system and classroom procedure; evaluation of instruction has been difficult; development of new instructional procedures has brought a need for greater precision in evaluating student progress (which has not been solved as noted in the preceding comment); and until recently, only some of the important objectives of education could be measured. (Kendall's methodology cited

earlier may not allow Bushnell's comments to go unchallenged regarding the inability to evaluate student progress.) Bushnell states, "a system approach, aided by modern strategies for change, . . . makes it more likely that change programs will succeed where in the past they generally have not" (1971, p. 9).

Management Science, Decision Techniques

Nine characteristics of a management information and control system (MICS) are offered by Hodge and Hodgson (1969). It should be computer based, have direct interface with management, incorporate management's needs, be management "interactive," provide current status of the system within a reasonable time, maintain an historical result of the facility, project future behaviors (even if only simply), operate in a decision-making environment (and not just a reporting one), and provide management with control of the information in the system. They also distinguish between programmed decisions (algorithmic) and unprogrammed decisions (heuristic); the latter have been used successfully by the Defense Department they report (1969, p. 71).

John Evans distinguishes between Management Information Systems and Management Science noting that management

science uses principles (such a mathematics or economics) to aid in decision making (1970, pp. 294-295). Many of the specific techniques which follow have been developed by management science researchers although they have found widespread application in business and industry information systems.

In a discussion of computer-aided decision-making, Herbert A. Simon (1970) notes a trend to develop programmed into unprogrammed methods for higher level management. McMillan and Gonzalez describe deterministic and probabilistic models of decision-making, "we might have a system for which, theoretically, there is an optimum design or optimum mode of operation within defined and unvarying conditions. The model of such a system would be deterministic. . . Systems that deterministic models represent are devoid of uncertainty, and changes of state can be perfectly predicted. . . . Probabilistic models, by definition, are those that include the representation of stochastic processes of their results. Because uncertainty is more the rule than the exception, most of our models will be probabilistic" (1968, pp. 13-14). The algorithmic model is problem solving (p. 17), and the heuristic model might be seen as awareness producing.

Bonini (1963) presents a heuristic stochastic model which is noted for its index of pressure on the behavioral aspects of decision making.

Man uses heuristics to make inferences, trying all the time to remember to apply the rules he has learned for selecting among the inferences (Miller, 1967). He also finds humans are limited and selective in their memories: therefore, how would we deliberately increase problem solving and decision-making capabilities of humans? (pp. 311-312). The advantages of man-machine symbiosis were mentioned previously in this paper, and are certainly worthy of consideration in the design of an information system.

Kenyon B. deGreene discusses man-computer inter-relationships noting the distinction between heuristic program methods and those of algorithms.

> Heuristics are defined as rules of thumb, methods humans use, as opposed to algorithms or systematic solution procedures, methods customarily used by computers. . . . [heuristic] programs need not be large and complex so long as they incorporate "powerful heuristics." (1970, p. 322).

Heuristic programs have contributed to understanding means-ends analysis, abstraction, planning, and search (in depth rather than breadth) as deGreene concludes.

For an analysis of the scope of heuristic programs the reader is referred to Boguslaw (1965, Ch. 4). He discusses six types of heuristics which have behavioral implications.

Computer-aided induction is built into the I/D/E/A model, as described by Kent (1968). He clarifies the role of man-machine relationships: in order to overcome

> the limitations and restrictions of pure machine-induction, we are seeking a workable interplay between the investigator's judgment about and knowledge of his data, and the data-handling power of a time-shared computer. To this end a computer-induction program, IDEA, has been designed either to run on its own, or to interact with the investigator by (1) presenting him with the facts he requires to evaluate each major "decision" in the analysis, and then (2) accepting his concurrence or overriding judgment before continuing on to the next major decision. In addition to its "interactive mode," IDEA has two other distinguishing features: (a) heuristic computation procedures are used in those cases where the combinatorial aspects of the analysis would require extensive computation, and (b) different heuristics are used for different types of data, enabling IDEA to operate on a mixture of nominal (categorical), ordinal (ranked), and interval or ratio-scaled measurements. . . . It appears that such interplay between the investigator and his data holds promise for a more effective inductive analysis than either man or algorithm could produce alone. (p. 40)

In concluding this discussion of heuristic programming and techniques, Wilson and Wilson (1965) have prepared a commentary on heuristics and system synthesis, from which they conclude, "the synthesis of a new system must often be

attacked heuristically" (p. 302). Because network design is an integral component of most information system which seek to control planning implementation, Wilson and Wilson also discuss the similarities and differences in heuristic synthesis with network design. In essence the heuristic approach is compatible with, and often enhances network design.

As virtually any administrator will attest to, decision-making is often done in conditions of uncertainty. Earlier it was noted that administrators will make decisions without facts--using their intuitive grasp of a situation as a basis upon which to decide. Decision making involves choosing among alternatives with various probabilities of success, but usually of not knowing those probabilities. There are techniques for making decisions in such conditions. The "tools" of uncertainty quantification include decision tables, statistical decision models, Bayesian statistical models, linear programming, and dynamic programming (Hodge and Hodgson, 1969). Alkin and Bruno (1970) identify the operations research (OR) techniques as linear programming, dynamic programming, Leontief input-output analysis, queuing theory, Monte Carlo method, computer simulation models, and the Markov chain (pp. 200-202).

The Bayes approach is described by Neter and Wasserman (1967, p. 495) as follows:

> The procedure that calls for choosing the act that maximizes the expected payoff is often called a Bayes procedure. The optimal act . . . is then called a Bayes Act. Note that the term Bayes procedure is merely an alternative expression for the criterion of "maximization of expected payoff" in situations under risk where, in the terminology here, prior probabilities are applicable to the different outcome states.

Kyohei Sasaki (1968) finds:

> Bayesian decision theory is decision theory under uncertainty. . . . [It is] essentially a logical analysis concerned with the choice among possible courses of action when (1) the consequences of the course of action will depend on the state of nature, (2) the state of nature is unknown, but (3) it is possible to obtain the state of nature by experiment. . . . Decision makers (persons or organizations) frequently are faced with the problem of selecting a course of action in a complex situation having many alternatives that result in many possible consequences. Decision theory is primarily concerned with assisting in decisions under the complex situations resulting from uncertainty. . . . If we have a large or infinite number of available states of nature as well as strategies, we require techniques for selecting the optimum strategy. In decision making under risk several methods are available--for example stochastic programming. . . . [Other methods are] incremental analysis, or the critical ratio analysis . . . game theory [which] can be reduced to linear programming . . . linear programming is decision theory under uncertainty . . . (pp. 205, 210, 228, 232)

The Proceedings of the 1970 Invitational Conference on Testing Problems contained a substantial review of and interest in Bayes statistics. Novick presented a paper on

the current variety of Bayes' methods and concluded " . . . when we talk about educational information systems . . . the Bayesian approach will be the way to go" (1970, p. 91).

His optimism may well be justified if the results of Bayes' applications which he reported, and which have been used in business and industry, are of significance to education. It would appear they are.

In the same Proceedings, Gene V. Glass, who was the chairman of the conference, stated that the National Assessment of Educational Programs (which is now being operated by the United States Office of Education) is a prototype information system for education (1970, p. iv).

Womer and Mastie (1970) ask, "How Will National Assessment Change American Education?" Although acquisition of data is a difficult task, assessment will act as a catalyst for educational change--a tool which is informative, not prescriptive: a device to aid in planning.

The Educational Planning System (EPS) reported by Brewin and Sisson (1971) uses formal analysis and computer techniques, uses an incremental planning approach, incorporates "crosswalk" (a manual method to convert budget requirements into program requirements), and indicators to show program progress. The computer shows gaps between

performance and stated objectives, between revenues and costs, to allow management decisions about program direction and growth. The value of EPS is as strong as the programs which have been used in aerospace where accountability first was found as cost-effectiveness/benefit analysis.

Educational planning is defined and outlined by others (Alkin and Bruno, 1970; Cleland and King, 1968; Sutterfield, 1971). Decision-making and all its techniques and the assessment of data provided by NAEP combine to allow for a more powerful (effective) educational establishment. In recent years the literature has been filled with the foremost method for educational planning and accounting--PPBS--Planning, Programming, and Budgeting System. The budget reform phases which have lead to PPBS were identified by Alkin and Bruno (1970) as the "control" phase, the "management" phase, and now the "planning" phase.

In addition to the Planning aspect of PPBS, however, are the Programming and Budget components which imply a management function. Rappaport and Brown (1971) note the importance of management steps with a detailed listing of the requirements of a PPB System (pp. 204-222).

Program, or Project as it is often called, Management is a concept which is transferred from the business world (particular aerospace management) to education. Cook (1971) asserts "Program Management . . . is a way of thinking as much as it is an operational technique" (p. 172). It is a matrix arrangement for management. The roles ascribed to Project Management are: Project Manager who determines "what and when" work is to be done, and the department head (principal?) who decides "how" (p. 173). In the planning and implementation of a program several techniques are used to measure progress as defined in the plans. The network technique, consisting of PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method) are techniques "which are extensions of more fundamental systems theory . . ." (p. 180).

Project Management and Matrix Organization are system techniques to enhance control of programs which are clearly defined (as they should be using a comprehensive system approach) (Cleland and King, 1972). Budde (1972) finds that system technology has a void in dealing with complex problems and recommends a lattice system approach which provides a diagram of a multitude of complex variables.

Allen Kent, who is well known in business systems literature, outlines system design criteria: objectives, functions, performance requirements, and environmental variables. This last category is particularly valuable in designing "change" into a program, with a discussion of human resistance to change (1971, pp. 283-304). (Although written from a business systems viewpoint, most of the criteria are useful in designing an educational information storage and retrieval system: education is big business.)

Models, Modeling, System Phases

A model is a means of replicating real phenomena; a representation of a whole; an attempt to explain a complex organization or process by comparison or analogy with a commonly understood or less complex representation.

The earliest models compared physical objects with abstract ideas; much as the pyramid structure has been used to indicate a hierarchical organization structure. The industrial revolution impact led to a viewing of all phenomena as mechanical. The mechanistic structure still exists in organization theory. It is a stultified view, there is no "process." Each component is seen as an autonomous, independent function, and there was little or no

need to see or look for interrelationships.

The advent of life science understanding (probably as a result of Darwin's Origin of the Species in 1859) provided the impetus for organismic/biological models. The social sciences still utilize this conceptualization of interdependence, symbiosis, "life processes."

However, now cybernetics have provided a more thorough understanding of processes (both structure and function) and the result is cybernetic and developmental models. System models are an outgrowth of cybernetic models, although Chin (1969) believes that only developmental models show process.

Le Baron (1969) criticizes education for laxness in model building; for the incompleteness of their models. He points out that school planning units are separated from operating units, which are separated from designers and producers of materials, which are separated from the professional schools in colleges and universities. This is not representative of the holistic view of a system approach.

McClelland (1968) identified classes of models, and prepared a definition of an Interorganizational Paradigm (an Intersystem Model) and a list of criteria for evaluating a model of change.

From his experience as a team member to evaluate a change model, Taylor (1971) reported that "a change model has great potential for bringing about educational innovation. It can help a school achieve its goals . . . a far better approach to the process of change than the outdated practice of administrative mandate" (p. 531). He provided ten evaluation criteria which were used to determine model effectiveness.

The creation of phase models is a typical way of system analysts to describe a system in operation. The validity of phase models was analyzed by Havelock (1969) and Kaufman (1970); Bushnell (1971) defined phases of system models with a high degree of complementarity.

Ammentorp, Daley, and Evans (1969) identified the education manager as one who has training in traditional statistics, who casts problems in terms of alternate and null hypotheses and consequently eliminates interesting variables. They propose system analysis and models to include a comprehensive view of a given situation.

Launor F. Carter lists the steps to take in doing a system analysis and illustrates with a flow diagram of relationships. He chooses an eight step analysis, though the number which Kaufman required was five steps with

sub-steps (1970, p. 143) and Bushnell identified six steps (1971, p. 10).

Realizing that most systems literature is descriptive rather than critical, Harry J. Hartley sets out twenty-five limitations of systems analysis so that educational managers will not approach system analysis with false expectations.

Yet, with the glamour of the system approach promise and the criticism of the realities one general observation has been made by Heinich (1970), the introduction of technology (not just hardware) into a system reduces entropy (amount of randomness, in the communication literature, or loss of thermodynamic energy, in the physics literature). Therefore a reduction in entropy--negative entropy--implies an ordering, structuring, and predictability of a system with corresponding increases in energy which yields higher efficiency and possibly effectiveness.

There are limits of computers for management information systems, however, and John Evans (1970) identifies these with a list of characteristics best suited to MIS applications: (1) large amounts of information to be stored or processed, (2) a large number of interacting variables must be related or analyzed before a problem can

be solved, (3) repetitive activity exists, the decisions for which can be made more or less automatically, (4) accuracy is important or useful, and (5) the cost per unit of output is low (pp. 275-276).

Alkin and Bruno (1970) in a discussion of the applications of a system approach state that (1) it is applicable to "micro" problems, and (2) the ultimately most valuable application will be in selecting among alternative processes for achieving specified educational objectives.

One additional factor is identified by Paul Baran (1968) when he diagrams the problem of information overload: push versus pull. When automatic reporting systems provide information on a regular basis rather than on demand there are "tons of copies" whereas if the searcher can request what he needs there is a degree of selectivity that enhances a positive attitude toward information systems, models, and the entire system approach.

Applications of Models

There are several highly notable applications of system models around the country which are either in operation now or which have been operated.

The SPEEDIER Project in Pennsylvania was based on

five phases and was designed to be a linking agency to assist schools in their own renewal. Ultimately, it was felt that after the catalytic influence of SPEEDIER project personnel, a school could continue to be self-renewing. The Third Annual Report (1970, ERIC #ED 040 910) described their successes and concerns at the conclusion of their funding.

Operation PEP (Preparing Educational Planners) in California was a comprehensive series of reports, also in the ERIC system, which used a variety of system methods and which provided a Management Information Systems model and information handling packet. The 1967 report (ERIC #ED 020 584) defined the overall plan, the 1970 reports (ERIC #ED 046 120 and 046 119) provided a comprehensive review of the system model as it was refined, including antecedents to model development. The Model/Strategy for Educational Planned Change includes seven components.

The New Jersey Urban Schools Development Council report of 1970 (ERIC #ED 045 728) presents an analysis of systems applications in education, and includes a five step model.

The Planning and Management Information System (PMIS) is the work of the Great City Schools of Washington, D. C.

Their model was briefly mentioned in an article in Phi Delta Kappan (53[8], April, 1972, pp. 520, 523). They have subcontracted their information system, and have a most comprehensive model, data base, and operating description. The Council of the Great City Schools is a coalition of twenty-two of the largest urban school systems organized to study, develop, implement, and evaluate programs designed to promote educational reforms that will insure quality and equality of educational opportunities.

Theories, Paradigms, System and Developmental Models

Everett Rogers (1962) identified the need for a theoretical model of adoption in a social system. He suggested computer simulations and other simulation and game approaches might be one avenue of value (pp. 296-299).

Gouldner (1969) describes pure and applied research and system models. He finds three basic reasons for models: (1) system interdependence is shown, (2) direct and indirect strategies may be identified, and (3) possibilities of intervention in a problem may be considered. He criticizes existing models for not showing points of preferential entry into a system (considering cost and efficiency). And, he requires that a system of assignment of weights to

different components of the system be developed. In addition, Gouldner observes that there is no theory of unanticipated consequences in models at this time.

Heinich (1970) includes a major consideration of models and paradigm theories in his monograph (which was originally his dissertation in 1968). He discusses organicism, systems theory and loci of control. "The tendency toward organicism manifests itself quite differently in pure sciences, applied sciences, and comprehensive coordinated management systems which tie together a number of applied fields" (pp. 104-105). Systems theory seeks unifying principles, while "loci of control for purposes of manipulation are not in and of themselves important. The attempt is simply to investigate and create models of what seems to be rather than creating models for managing a series of events toward specific goals" (Heinich, 1970, pp. 104-105).

Pure science models seek explanation of phenomena; applied science models seek arrangements which permit the management of events for human ends. Either type of model supplies a valuable addition to the theories upon which empirical research provides validation and/or modification.

In education, the school of administrative theories

is a recent development, but it is important. The inclusion of technology in these developments should aid in the formulation of sophisticated theories as was mentioned earlier regarding the reduction of entropy upon inclusion of technology in a system. That education is not traditionally technological and has not sought technological solutions to its problems must be realized and corrected. Yet, as it moves in the direction of technological sophistication, models will make the transition smoother and more productive (Heinich, 1970, pp. 57-58).

Theories explain--what is or what is "becoming." They generate strategies for research; generate new questions; and provide a basis upon which complex phenomena may be studied. Although model is frequently considered synonymous with theory this practice may be misleading. Theory represents the content and model represents the structure of phenomena. Yet, the model is based upon the content and can hope to be as nearly representative of the phenomena as possible. The congruity is called isomorphism (iso--equal, similar, identical; morph--body). Thus the model will have some semblance to that which it represents, in terms of structure, process, time. To further confound the situation, the word paradigm is described using the

word model as a synonym. It may be appropriate to consider a model as a diagrammatic representation and a paradigm as a verbal representation. Such a distinction will be applied as closely as possible in this paper. (This paragraph based upon Heinich, 1970, pp. 62-64.)

One of the foremost theorists about models and modeling is Robert Chin. His observations about models will provide the concluding observations in this section. He presents an entire section of Chapter 6 in Bennis, Benne and Chin (1969, pp. 297-312) on the utility of system models and developmental models for practitioners. His concepts of models are provided to be "pegs to hang your knowledge on" as it has been identified by Earl V. Pullias, Professor of Higher Education at the University of Southern California.

Chin's discussion of the key elements of models is virtually imperative for those who wish to have a feel for the purpose and utility of modeling. His section on the change-agent and models presents five questions related to the needs of a "theory of changing" (mentioned earlier and distinguished from a "theory of change." (1) Does the model account for the stability and continuity in the events studied at the same time that it accounts for changes in

them? (2) Where does the model locate the "source" of change? (3) What does the model assume about how goals and directions are determined? (4) Does the model provide the change-agent with levers or handles for affecting the direction, tempo, and quality of these processes of change? The fifth question is inherent in the preceding four; (5) How does the model "place" the change-agent in the scheme of things? (pp. 308-309).

Chin proceeds to analyze the system model, the developmental model and the inter-system model on the basis of the answers to these five questions.

> A "system model" emphasizes primarily the details of how stability is achieved and only derivatively how change evolves out of the incompatibilities and conflicts of the system. A system model assumes that organization, interdependency, and integration exist among its parts and that change is a derived consequence of how well the parts of the system fit together, or how well the system fits in with other surrounding and interacting systems. The source of change lies primarily in the structural stress and strain externally induced or internally created. The process of change is a process of tension reduction. The goals and direction are emergent from the structures or from imposed sources. Goals are often analyzed as set by "vested interests" of one part of the system. . . .
>
> The developmental model assumes constant change and development, and growth and decay of a system over time. Any existing stability is a snapshot of a living process--a stage that will give way to another stage. The supposition seems to be that it is "natural" that change should occur because change is rooted in the very nature of living organisms. . . . Some effects of the environment are presumably necessary to the

> developmental process. The direction of change is toward some goal, the fulfillment of its destiny, granting that no major blockage gets in the way. "Trouble" occurs when there is a gap between the system and its goal. . . . very frequently the model is used for studying the unique case rather than for deriving "laws of growth"; it is for descriptive purposes [Emphasis mine].
>
> The third model--a model for "changing" is a more recent creation. It incorporates some elements of analyses from the system models, along with some ideas from the developmental model, in a framework where direct attention is paid to the induced forces producing change. . . . The models for changing are as yet incompletely conceptualized. (Chin, 1969, pp. 309-310)

The use of models in the change process, to understand the complexities of structure and function are clearly delineated. Chin's paradigm of the developmental model does not seem to accurately represent the work of system analyst's during the past decade. His paradigm was originally prepared in 1960 for the 1961 edition of The Planning of Change. It appears from the writings which have been reviewed that many of his "process" concerns are now incorporated into the thinking of system theorists. Whereas he describes the developmental model as containing "phases, stages" and the system model as having "structural integration," it is apparent from the literature that phases have been incorporated into system thinking in models and operations for quite some time--at least since the mid 1960s. He defines change as deriving from structure in

the system model, and as a constant and unique function in the developmental. Yet current system models provide for feedback as a constant mechanism of change, and the adaption function is inherent in the writing of virtually all current system theorists.

It will be seen that the model presented in this paper is a compendium of Chin's descriptions of the system, developmental, and intersystem models.

Summary

The Survey of the Literature has reviewed material related to a number of components of the change process. The major works in the survey have been: Havelock, Planning for Innovation (1969); Bennis, Benne, and Chin, The Planning of Change (1969); Miles, Innovation in Education (1964); and Rogers, Diffusion of Innovations (1962). The considerations of long-range planning, planned change, renewal, alternative futures, and forcing-function were mentioned as they were relevant to the topic of the change process.

Knowledge Utilization requires Development of the research findings so that Innovations (an idea, program, or product perceived as new) could be made available to practitioners.

The use of Linkage roles and systems was discussed and included Temporary systems, Demonstration programs which must be in "regular" schools for credibility, and Change-Agent/agency functions were reviewed. The Dissemination of programs to potential users through the mass media and various formal and informal communications networks then received attention.

Adoption/Implementation, the next phase in the "diffusion" process studied barriers and inhibitors of change, and discussed an often slighted aspect of adoption--rejection. Multiple adoptions produce diffusion, which is the spreading of an innovation among institutions and within an institution (which again is seldom covered adequately in the literature).

Strategies are required to effectively produce adoption of innovations--whether those are prepared within the school, by the school administration, or outside the school by a change-agent/agency. Occasionally such changes are instituted by "forcing-functions" which act both internally and externally. Community participation and attitudes were then noted as being significant factors in successful adoption and general operation of a school/district. It was found unwise to ignore or turn away from

a potential confrontation with community members and leaders. Ignoring a resistance does not make it disappear --only enhances its sense of rightness, and solidifies the barrier it presents. Various strategies of implementation were then considered.

Communication within the school and district was found to be a major force in successful strategies. The distinction between formal (organizational) and informal (personal) networks was considered, and strategies for facilitating the networks to enhance innovation were overviewed. The small group techniques were mentioned for their application to opinion formation and attitude change. Force-field analysis was also included for its benefit in defining all facilitating and inhibiting forces acting upon a given situation.

The significance of professional education was noted and programs for teacher, administrator, and change agent preparation and in-service education were reviewed. The role of para-professional training was identified as being significant in any change effort.

The literature on Management and Administration included theory, decision-making roles and significance, constraints, and costs. Then Organizational theory and

practice was discussed with emphasis on both the structure and function of organizations considered as they affect and were affected by innovativeness.

The System Approach literature was concerned with system concepts and definition, information systems which included management information systems and the variety of techniques which are peculiar to such systems. The advantages of computerized information storage and retrieval systems were analyzed and certain constraints identified which might affect a decision-maker using such a system.

Management science was defined and compared to management information systems. Then the role of management science in information systems was outlined with a selection of mathematical techniques identified which are helpful in decision theory and practice.

A very basic technique in management information systems and in the overall system approach is the use of models. Models and modeling were mentioned to identify kinds of models and their purposes. Design factors were considered as a brief review of system analysis techniques was included in the material on models.

The inclusion of material on application of models provided a perspective on the development and application

of system techniques by special projects and schools. The special projects were funded by outside agencies who were developing valid models of the change process to act as linkers with school districts in implementation of change.

Then an overview of Theories, Paradigms, and System and Developmental Models concluded the Management and Administration section of the review of the literature. An analysis of the more abstract considerations of paradigms was made particularly in light of Chin's work on models for change and changing.

It was noted earlier in the chapter that change strategies which fail are so serious in their repercussions that failure is, for all practical purposes, not allowable. Thus, a system analysis must be done by a thorough team to develop (through synthesis of the findings) a change strategy for the adoption and ultimate diffusion of an improved educational practice.

CHAPTER III

METHODOLOGY: DESIGN/PROCEDURES

Introduction

The comprehensive system analysis has been compared to the scientific method and to Dewey's variation of the inquiry process which is based on that method. Yet, direct parallels are somewhat difficult to distinguish. One of the most significant characteristics of the scientific method is given very little play in the paradigm with which most scientists ply their trade: the role of intuition! The Gestaltic "A-ha!!!" is one of the more acceptable of the scientist's attitudes toward intuition. Although most researchers realize the significance of intuition in their own thinking, they tend to demand some methodological rigor from their colleagues, which, when carried to the extreme, is inhibiting to the creativity necessary to function in a scientific, inquiring capacity. "Creativity is crossing the heuristic gap between problem and discovery" (Polanyi, 1962).

The intuitive sensitivity of artistics (prescience) precedes formal validation by scientific means (Heinich, 1970, pp. 26-27). Artistics are writers, craftsmen, and others of "the arts and humanities" who see a world that does not yet exist and who can describe it in terms of structure and function in such a manner that it provides guidelines for growth. The concepts of such writers increases awareness of possibilities and heightens expectations for change without providing the necessary vehicles for their realization.

It is the awareness of this anomalous situation which originally started this search for a generic model of the change process. "Confirmed inadequacies produce new paradigms from the anomalous situation" (Heinich, 1970, p. 45). Yet, the change process is so complex; it contains so many variables; the findings are so disparate, that integration, or system synthesis, seems a virtual impossibility. "The scholar is a <u>supreme generalist</u> who can organize disparate findings into theories that show us where we are going" (Havelock, 1969, p. 7-17; 1964, p. 74).

Pellegrin (1965, p. 74) states, "theory gives meaning to facts . . . "; and believes that in research training programs, we should banish <u>radical empiricism</u> but we should

insist on methdological rigor.

Theories provide experimental laws which yield hypotheses--going from the broadest to the most specific. Paradigm theory produces theories which then facilitate the development of hypotheses (Heinich, 1970, pp. 59-60). It is experimental laws which predict with certainty, theories offer guidelines not formulas. Models are occasionally claimed to offer prediction capabilities, but such is not the case; they offer a view of a phenomenon and of alternatives, but they do not predict which of those alternative phenomena will be. Even mathematical models, which are powerful predictors, are based upon probabilities which may or may not come to fruition. The model does, however, provide a method of viewing complex phenomena to make them easier to comprehend.

Also, models are often confused with, or even considered to be synonymous with theories. This is unfortunate, for the model merely shows the structure of the content of the theory. To further complicate the situation, most dictionaries define a paradigm as a model. Paradigms are verbal descriptions of phenomena whereas models are usually visual representations (diagrams, flow charts). A paradigm is a conceptual framework according to Heinich,

and as such they are not directly provable. They survive because they better fit (1970, pp. 51-52).

The Design: Methodology

The system approach methodology (analysis and synthesis) represents the basic plan used in this research. Within the constraints of working with a hypothetical/theoretical situation (the literature) instead of a "real" system (which would have been too specific to develop a generic model), the methodology of system analysis and syntheses were applied. The steps which were followed are basic to the system approach: Identification of the Problem Situation, Definition of what is to be done (Questions to be Answered), Consideration of Alternatives (the various models identified in the literature as models of change or changing), and Synthesis of the components into a Generic Model and Paradigm.

The validation of the model is provided by internal controls for the purpose of this study, and ultimately by the test of time in the long-range perspective. Criteria for measurement and assessment of models for changing have been defined by Chin (1969, p. 309; 1967, pp. 339-340), and are included in the following:

1. Does the model account for the stability and continuity in the events studied at the same time that it accounts for changes in them?
2. Where does the model locate the "source" of change?
3. What does the model assume about how goals and directions are determined?
4. Does the model provide the change agent with levers or handles for affecting the direction, tempo, and quality of these processes of change?
5. How does the model "place" the change-agent in the scheme of things?

"The application of these five questions to the models of systems and models of development crystallizes some of the formation of ingredients for a change-agent model for changing" (Chin, 1969, p. 309). These criteria are not complete, but provide basic guidelines for model assessment.

"A series of questions to use in evaluating a model of changing, its accompanying strategy and tactics, its theories and practices will help illuminate this difference between 'change' and 'changing'" (Chin, 1967, p. 339).

1. Does the model provide for the mutual recognition of the change agent and the client system for each other's special role: the change agent with his

technical competency and the client system with his values, perceptions, and rights of self-determination?

2. Does the model provide the change agent and the client system with the levers or handles for affecting the direction, tempo, and quality of the process of change? . . .

3. Does the model provide a reliable basis of diagnosing the strength and weakness of the conditions confronting the client system?

4. Since change and its attendant processes occur over a period of time, does the model define the interval of time required for a continuing relationship of the change agent to the processes of reaction, anxiety, obstacles discovered, and new supports to be built? . . .

5. Can the model of changing be communicated realistically to the client system without destroying its basis of effectiveness?

6. Does the model provide its own criteria for assessing when the model is applicable and when not? Since there must be many potential ways of changing, it is desirable to make available to both change agent and client system a model offering considerable flexibility so that it can encompass a wide variety of actual conditions. (pp. 339-340)

It is against these criteria that the model/paradigm will be measured, internally.

The Design: Procedures

The first step was in defining the questions from the problem situation and finding consensus that the topic, questions, and approach were acceptable.

The review of the literature was accomplished by both traditional and computerized search methods. The typical bibliographic search materials were utilized,

including card catalogues at four major universities, Books in Print, Published Bibliographies on the subjects, and a variety of guides to periodicals and journals. Various Abstracts were consulted as were the CIJE and RIE which access documents and journals in the ERIC system. Finally, a less traditional, but exceptionally valuable computer search was conducted into the ERIC files using descriptors found in the Thesaurus of ERIC Descriptors. Three separate searches were performed to refine the material and to update it as new leads were discovered. The matrix intersection of descriptors is an interesting technique for delimiting the search and it proved exceptionally worthwhile.

The material thus acquired was searched for patterns and redundancies which would indicate the points of agreement and emphasis in the writings from a wide range of fields. In addition, promising auxiliary concepts were held in abeyance pending determination of their applicability to the new model/paradigm. This provided the analysis phase of the system approach.

Synthesis was accomplished by utilizing the variety of criteria identified in earlier portions of this paper, and providing a matrix of the criteria and the requirements

of the system to determine the best fit.

The matrix method was based upon identification of the needs of a change model (as noted in the literature), and the goals of a change model, also identified in the literature. The gaps which became evident in the matrix overlay were the components which received emphasis in this proposed paradigm of educational change--forcing function, community involvement, force-field analysis, management information systems, professional education, and computer-interactive processes.

The resultant model and paradigm are presented in Chapter IV. Their applicability to the change process in education will be determined, ultimately, by time. In a sense, this represents an approach to a theory of change using a paradigm as the conceptual framework by which additional empirical research may be continued, and from which the model will be refined.

Questions to Be Answered

1. What components, phases, steps of existing studies on educational change, diffusion, adoption, and educational and industrial management can be intersected with the findings and methods of system

analysis and synthesis, and of management information systems to provide a generic model of change?

2. What questions exist or can be developed which will provide guidelines to educators planning an educational change? Ultimately, how can these questions relate to the paradigm of change?
3. What information exists on school district characteristics and requirements that can be extrapolated into the generic paradigm/model of educational change?

Conclusion

The procedures and methodology used in the design of this research were based upon the system approach. Certain criteria were identified which would be used to assess the validity of the paradigm proposed in Chapter IV. The phases of the system analysis were delineated and the synthesis procedures were presented. The questions to be answered were also included.

To reiterate Heinich, "Paradigms are conceptual frameworks . . . are not directly provable. They survive because they better fit . . . " (1970, pp. 51-52).

CHAPTER IV

THE PARADIGM OF EDUCATIONAL CHANGE

Introduction

The past chapters have indicated the conditions of and need for change in public schools. Changes which affect not only the curriculum, but the foundations of the educational structure and processes. Changes need to be made in the purposes and methods of accomplishing them, and the changes need to be made in a far shorter time frame than has been reported by previous researchers such as Mort and his multitude of disciples. Strategies have been developed and an adequate knowledge base exists to overcome the effects of misoneism. Since change is inevitable, the problem remains, how to provide for it. The establishment of goals and objectives, to affect the direction of change, and of controls to affect the rate of change are the provisions to be considered and included in the proposed paradigm of change.

Although there has been considerable reference to

the time frame of adoption and diffusion of educational change, the main purpose of this paradigm is not to accelerate the rate of change; it is to assist in the development of purposive, rational, empirically-based change. This will be done by using the change strategies which have been developed and used in the field, and which are included in this paper. Ultimately the change process will be institutionalized leading to self-renewal.

There are several components of the change process which have been noted in the literature, but which have never before been incorporated (collectively) into a paradigm/model of the change process: societal conditions, particularly the "forcing function" concept; the inclusion of a "Change Control Board" at a district level to provide a liaison between practitioners and a "linking" agency, and to aid district administration in management of special projects with a continual "pulse" from feedback on such projects; and, a computer-based information system as an integral part of the linking agency/change agent function--to prepare alternative programs for consideration, to "phase" the implementation project for the local adopter, and to maintain comprehensive records on the strategies used for application to subsequent change efforts by

similar districts as a part of a major diffusion effort.

The components outlined in the system flow chart and the organizational charts do not represent all steps in a change effort. They are provided as (1) important considerations which should be emphasized, and (2) as suggested guidelines which will supplement the literature on change which has been cited in Chapters I and II. A good change model should consider its own demise--this one does that. In fact, it is hoped that refinement of the model would occur as a result of the comprehensive data file suggested in the model itself. The refinement might even be so complete that only the barest outline of the model would remain; if such a condition were to improve the ability of change to succeed this model will have served its purpose. It is designed, in other words, to be a transient form!

The ultimate aspiration of this paradigm/model of change is that it will lead to higher levels of sophistication and abstraction in the knowledge base of change. If we can go from data to information to knowledge to wisdom about change, and how it is accomplished purposively and meaningfully it will have met another goal of its author.

To be able to systematically improve our <u>conceptualizations</u> and <u>practices</u> through the use of technology in

education (and ultimately technology of education) is a value implicit in this entire work.

Information systems can control many variables, and can assign priorities to alternatives in the selection process to facilitate decision-making with purpose. That is, to have goal-oriented, objective-defined management in education. Thus, a management information system is integral to the Educational Improvement Agency which is proposed in this chapter.

The contents of the paradigm/model are: Conditions Outside the Educational Domain--Societal conditions, Research and Resources, Development processes, Professional Education, and the Educational Improvement Agency. Each of these provides "inputs" to education, yet none is within the distinct domain (jurisdiction) of the local district; all influence it. These outside influences are indicated on the flow chart with alpha-numeric box numbers (e.g., A.1, E.0, E.2.1, etc.).

The functions which are carried on within the district are defined with numeric designators for the box numbers (e.g., 1.0, 1.1.1, 5.0, etc.). The main headings for the intra-district functions are: Awareness, Knowledge Gathering, Studying of Inputs, Strategies . . . , Adoption

Decision Point, Operations/Change Control/ Adoptions Strategies/Adoption Integration/Institutionalized Change/ Dissemination/Diffusion. These components appear in the Generic Paradigm/System Models of Educational Change (Illustrations 1 and 2).

The time-phased aspect of the process is somewhat indicated by the order in which they are presented, although it must be noted that phases may be skipped, taken out of sequence, or utilized in a variety of permutations. The important consideration is that the selected change is successfully adopted and eventually diffused. The steps, are not most important--the outcome is.

The Paradigm of Educational Change

Any paradigm of change must consider outside effects on the change process within an organization. The most pervasive influence on any efforts may be seen in the Societal conditions. Both local community and total nation and world conditions permeate changeability. Circumstances enhance or inhibit change from this domain. An outline of the components of Societal conditions appears below.

A. Societal Conditions

A.1 Human Resources (in society, community, school) Community Resources (places, activities, funds) History, Laws, Philosophy, Traditions, Sociological behaviors, Psychological attitudes, and general expectations are aspects which influence change.

A.2 Forcing functions which may affect change include natural disasters, crises, international relations and events, legislation, court decisions, foundations, and charismatic influences. These factors may also enhance change capability or make it outstandingly difficult or impossible (at least temporarily). This conceptualization does not appear in any other paradigms in this manner, although other researchers often allude to the conditions.

A.3 Supplementary inputs (to be considered) include, perceptions, intuition, feelings, reference and peer groups.

A basic principle of sociology and social psychology is that outside pressures or threats on an organization may cause a cohesiveness and bond between colleagues that never would exist under other circumstances. Conversely, a very

permissive, nonthreatening outside environment will allow for divisiveness and fighting within a group. Thus, the application of any forcing function must be in such a manner that it does not promote such cohesiveness against the innovator/innovation that there is no chance for success. Carl Rogers, the National Training Laboratory and similar groups offer techniques which may facilitate the openness necessary for effective change in behaviors and attitudes.

Another area of outside influence is seen in the Research and Resources function. Again, other change literature defines research or a related terms, but does not seem to see the use of resources.

B. Research and Resources

B.1 Research is basic ("pure") and applied ("practical"). Action research is under the applied category. Theories, findings, methodology, concepts, ideas, are the components of Research. Resources other than scientific research include writers and "artistics" who make intuitive judgments which are often amazingly insightful and often quite accurate regarding future conditions. The value in such writings is their prognostic value and their alternatives proposed. Empirical

validation of a concept often awaits adequate development to a point of being "educator-ready."

B.2 There are other futures approaches which have a higher "validity" in that they are based on more than intuition. Delphi forecasting, scenarios, and projections are based upon methodologies which give them greater power in viewing alternative futures. "Futures" researchers do not usually provide predictive validity, but they do serve to provide a range of possibilities of future states.

The value of research and resources as they have been described above is often severely limited because the kind of data does not "make sense" to the practitioner. It must be processed into different forms for meaningfulness and credibility. Such processing is done in Development and also by the linking agency/agent who interprets the findings and projections into terms which are of interest to the user.

Development of concepts, findings, material, and related research is an exceptionally important aspect of the total change process. It has been pointed out earlier that the best research is but raw data in local hands. Data have no meaning to users; users need information and

knowledge upon which to base planning and operating decisions.

C. Development

C.1 Development of resources and research inputs, and of local proposals, consists of Design (inventing solutions to problems and preparing concepts or materials), Packaging, Field Testing, and Improving innovations. Making innovations "educator-ready" is the essence of development. Further, the development function is important in providing feedback to researchers (both pure and applied) regarding the applicability of the findings to users, and the validity or reliability of findings.

The Survey of the Literature itemizes a number of difficulties faced by Development people who suffer some of the same "marginality" of the linker. Yet, the function is critical in education. There was great consensus in the literature that educators have less need for new knowledge, than for development of that which is known, into usable information for the schools.

Although the Development component of change models does not usually consider human development, it is necessary to prepare people for new conditions. Rather than make

human development appear like a mechanical process under development, it has been provided for in a separate category: Professional Education.

D. Professional Education; the development of human resources.

D.1 Professional Education is seen in three basic forms for several categories of professional persons. Pre-service training is to prepare professionals for careers in the aspect of education which they choose to enter (teacher, administrator, change-agent, other professional colleagues). It is strongly suggested that all professional preparation be for anticipated conditions and for attitudes toward changing, NOT for the status quo. In-service education is provided by universities, private concerns, and the districts themselves. It is designed to strengthen professional skills, perceptions, attitudes, and abilities. Re-training is not commonly found in the educational change literature as roles have not drastically changed the past several hundred years. The proposals of the teachers as facilitators of learning and managers of instruction will require

intensive and extensive re-training of role expectations and abilities. The need for this has been seen regularly in industry, and with the changing technology of education it will appear to be necessary in education within the next decades.

It is suggested by this component of the paradigm that professional education be cognitive, affective and psycho-motor in its scope. Such range will accommodate the diversity of roles which appear to be required of future teachers and administrators. Different decision-making techniques will need to be taught to administrators in consideration of the computer impact on education. Different methods of dealing with colleagues are demanded by "participatory management" which is found throughout the business community and is demanded by this paradigm as the only effective change method.

This paradigm is based upon the concept advocated by Ronald Havelock that a linking function is one way of synthesizing the three previous inadequate models. The type of linking function proposed herein utilizes a comprehensive computer in a central location and a network of computers tied in to the data base of the major unit. With access to computers in fifty states, at a minimum, the data

base of innovation possibilities and of strategies of innovation would be quite comprehensive. With refinement borne of experience the essence of the change process will be defined, and variations will be at local discretion. The linking agency proposed here is entitled the Education Improvement Agency, and it has three constituent parts: The Innovation Center, the Implementation Center, and the Excellence Center.

Havelock and Benne (1969) illustrate the linking agency of Western Electric between Bell Laboratories and Bell Telephone Company. Somewhat similar to their description, the linking agency proposed here would contain Universities, Foundations, and Laboratories studying educational concepts in the Research category. It might include the United States Office of Education, National Institute of Education, and related federal agencies in a complex information network containing Regional Laboratories, Regional Computer terminals (recommended at State Education Agencies), Central Data file, Demonstration units and change agents. The kinds of data included in the system would be that pertaining to innovations, their characteristics, cost, applicability, and requirements, and the strategies of change which would be based upon similarity of districts

who have innovated successfully and those who are preparing to do so. The third component of the unit would be represented by the local school district (the consumer). (See Havelock and Benne, 1969, p. 131).

The Educational Information Consultant is the knowledge linker/change agent (as recommended by the Far West Laboratory, Berkeley). Criteria for his entry into the "client" system are based upon district need, but basically the agent enters to arouse the awareness stage (Rogers, 1962) and departs as adoption is complete within the district, though he continues in the diffusion effort with others. Chin (1967) recommends criteria to determine agent entry into the client system, and also point of departure. The change agent's role is one of consultant (with its many ramifications; Havelock lists nine "ideal type" roles of linkers (1969, Chapter 7). As a consultant he will survive because he is able to prove the value of his service and advice to districts. Thus, he will enter on his own to interest the district in innovation and change, but will remain at their discretion, or until he determines his services are no longer functional or needed. Chin also recommends that a model must define when it is applicable to a client's change situation. In this case, the simpler

innovations may not require the power of a change agent, whereas the more complex ones would. Orlosky and Smith (1972) describe different types of innovations and their complexity of adoption. Havelock (1969) identifies complexities of innovations as factors in their adoption and diffusibility. These criteria will be developed in more detail upon the basis of experience of the linking agency.

The cost of a major system of information storage and retrieval, such as is proposed here, has been raised by several authors. Cuadras (1970) points out that the cost is difficult to assess if one considers what it costs to not have improved practices. He also finds that complex systems require a computerized management information system. Without such a system there can be no benefit.

Finally, Havelock (1969) states that there is an urgent need for studies of "internal dynamics of the organization" in diffusion literature. Such a complex, diverse field with so many variables would require an information system for analysis and synthesis of the data.

The components of the linkage agency are:

E. Education Improvement Agency

Collaboration between linking agency and user is an integral and necessary aspect of linkage.

E.0.2 The ultimate goal of such an agency is to develop such a spirit of self-renewal that the change-agent is no longer needed to induce awareness, but will provide strategies assistance with the use of the computer, and will assist in the "temporary system" function which was found to be highly valuable in adoptions. (Rogers' "innovators" often bypassed the AES County agent, and went directly to the college agricultural station. This is feasible with more innovative superintendents, as well.) Kurt Lewin's "freezing, unfreezing, freezing" operations are seen to be inherent in this type of linkage when using a "temporary system" approach.

E.0.3 Computer data file: included to assist in "awareness" arousal through its "innovations" file. This same file also provides "alternatives" for consideration by potential innovators. The second component of the data base is "strategies." This file provides alternative strategies for adoption to the district with the probabilities computed on each one as defined by (1) the innovation, (2) the characteristics of the district, and (3) informa-

...tion in the file on previous, similar innovations and conditions.

The interactive mode of the computer is designed to allow the user (either directly or through the change agent) to determine alternative innovations for consideration and to determine alternative strategies for adoption of the selected innovation(s).

The innovations file will match user characteristics with those of previous clients and select a variety of innovations to meet the stated needs of the user. If the user has not yet defined objectives, the change agent will assist the district in participant involvement, small group processes, and related activities in the process of consensual determination of goals and objectives (see E.1.1). From that base the user will interact with the computer data-file to determine innovations which might be used. Such innovations might also contain probability figures of the potential success of each innovation for each user, based upon previous clients' experiences.

Then, with the innovation selected, the computer would provide strategies for adoption (phased). The phasing would be developed around the concept that a phase would be implemented, the results would be fed back into

the computer for analysis, and the next phase would be defined, the results fed back, etc. (see E.2.2). Again, probabilities might be included in alternative strategies so that the local user could select among alternatives based upon both empirical data (probabilities) and knowledge of local receptivity (intuition).

Access to the file is limited to the change agent, or in the case of larger users, through the use of an access code.

E.0.3.1 Input to the files is from ERIC, federally funded projects data, local cooperating school districts, cooperating foundations, and research and resources identified in "B" above.

Although this system is designed to provide scope, depth, and managerial assistance in planned change it could be "ready" with innovations which have a high priority (nationally) for adoption in cases of crisis situations (which tend to enhance adoption). These priority programs could be determined by alternative futures among other methods.

E.0.4 A natural "entree" for the change agent would be through federally funded projects. Articulation between and among federal agencies to cooperate

with the agency would be necessary. The change agent would be part of a "package" of funds to effectively aid the district in innovation and adoption. In addition, because federal funds are routed through state education agencies for disbursement, it would seem logical to continue this arrangement and include the regional computers and change agency functions in the state agencies. An added benefit of this is that "radical" innovations could be brought to the attention of state legislative bodies in case state laws needed alteration to incorporate the proposed innovation. (This would save time for needs to "percolate up" from the local district, and might carry more impact if legislators realized that federal support were tied to elimination of restrictive laws.)

E.1 Innovation Center: a function of the linking agency which maintains information on innovations and provides services to districts in planning for innovation. Established as a "permanent" function it acts as a "temporary" system in working with school districts to plan for change.

E.1.1 Linking agent: known as Educational Information Consultant, provides assistance in the following ways: Holds planning meetings with district administrators in a "Planning, Conference Room with an interactive console and a large display system (much as is used in business and industry planning). This is done for pre-project planning and for project strategies planning of both the pilot program (if necessary) and the project. This service is to be available throughout the life of the adoption process; it will most likely be used as a phase nears completion and the next phase is being planned (using preliminary feedback from the phase in progress).

E.1.2 Data from the Excellence Center consist of evaluation, assessments, National Assessment, and priorities for improved educational practices ("excellence"). Such data serve to provide a perspective on the "raw empiricism" of the data in the Innovation Center and the Implementation Center.

E.2 Implementation Center: consists of Strategies for articulation with district and Demonstration

programs.

E.2.1 Cross Impact Matrix (Toffler, 1970) will be used to determine effects of a change on a variety of external and internal functions.

E.2.2 Data Base on strategies includes results of previous similar programs and the projected probabilities of success based on previous experience, projected conditions, and district characteristics (parameters). Progress information (feedback) is requested from districts at selected points in each phase of the adoption process for input and analysis to determine need for corrective action in strategies and to update master file with strategy and its results based on district parameters.

E.2.2.1 Administrators want information not just reports; this is accomplished by (1) interactive, "on-demand" reporting, and (2) change agent selection and assistance in interpreting computer outputs. (Larger districts, or consortia may choose to have their own internal change agent in a superintendent's office or a county office.)

E.2.2.2 A heuristic approach provides action guides even in the absence of a formal model or analytic solutions, and in the face of unanticipated situations (Le Baron, 1969), which would meet Gouldner's demand for a theory of unanticipated consequences.

E.2.2.3 System information criterion: inquiries will be analyzed to determine that all necessary information in entered before processing data.

E.2.3 Demonstration schools and programs will be used to provide a credible situation in which innovations are being applied. Such schools will be regular, working schools which will closely match the one from which the prospective innovator is located.

E.2.3.1 Opinion leaders will be used in the demonstration schools (if proximity makes such use feasible). Rogers (1962) identified the value of opinion leaders in diffusion of ideas, as have others in medicine, agriculture, and education. But opinion leadership requires proximity for interaction (or an adequate network of communication). If no demonstration project exists for a particular innovation, an initiating school may apply for

federal funds through regular channels.

E.2.4 A Phased adoption program provides for "divisibility" of complex innovations and allows for adaptations in a school system which enhances the chances for success of the innovation. The value of phases or stages is discussed in Miles (1964) by Mort, Lippitt, Watson, and Westley. Phased adoption also cross-relates to items 6.1.1 and 6.2.1.1 in this paradigm.

Phases (the time base) of the model are based upon adoption steps only (implementation and feedback). Research, for example, is not a direct part of the process of adoption, yet often adoption depends upon research findings or at least development of the findings into a usable, understandable form. Analysis of progress at each of Rogers (1962) adoption stages may be made by the system. Computer assisted change can manage several adoptions simultaneously, and maintain cross-relationships of each in terms of phases, personnel and resources needed, and timing (much like a PERT chart does, manually). This phased change could eliminate many of the dangers cited by Toffler

(1970) of future shock due to change rate, frequency, and scope.

The computer program should provide for simulations in the planning and implementation phases. The simulation model could be heuristically programmed but the overall model algorithmically programmed for specific outcomes (cf., Nan Lin, 1968, p. 113).

E.2.4.1 Phases will be determined on the basis of the innovation (complexity, divisibility, etc.); the adopter (attitude, readiness to and for change); outside constraints (community, legal, policy); and feedback from previous phases.

E.3 Excellence Center: would contain data on evaluation and National Assessment to provide a basis of priorities, goals, and objectives. It would be the "perspective" base of the Education Improvement Agency. This concept is based on the recommendation of Dieuzeide (1971).

The need to document the change process, which Havelock (1969) so urgently pleas, would be met in this component of the Agency. The most valued innovations and strategies would be included in this record for forwarding to research and

development functions for further study and refinement, to produce generalizations, principles, and perhaps even laws from the hypotheses and theories in the behavioral sciences at present. Evaluation information would be developed on data bases such as have been included in PMIS (1971), or as recommended by Richland (1965, 1968). These data bases would also be applicable to the other two components of the Agency--Implementation Center, and Innovation Center.

Elimination of redundancy in research, development, and diffusion systems could be accomplished by maintaining an Excellence Center data base. (Static data can be stored on microfiche for permanence, accessibility, and reduced computer tape requirements.)

E.3.1 National Assessment data base will eventually be a comprehensive instrument for planning and measuring progress. It is supposed to have all data in "summative" form for protection of reporting units. In addition the past fourteen years of federally funded programs contains an immense body of reporting data, on both strategies and

results, which would add a great deal to a planning and implementation data base.

E.3.2 Evaluation data from phases of projects ("formative" data) and from conclusions of projects ("summative" data) are entered for comparison of results to previous data bases. The outcome will assist in refining the data bases in all components of the Agency, and in planning for each successive client. The objective in having this unit is to heighten awareness of excellence in education, and of methods and means to achieve it.

Thus, the multi-faceted inputs from "outside" the district have been viewed as they contribute to the total innovation-adoption process. Readers who wish to receive a far greater depth in each or any of the areas should consult the survey of the literature chapter for citations. The Educational Improvement Agency, in addition, provides a vehicle for the dissemination and diffusion of innovations within a district and among districts.

The material in this next section deals with the steps which occur within the innovating district. The steps which are provided have come from the survey of the literature in all cases but one. The inclusion of a Change

Control function within a district is a result of the author's experience in industry as a system analyst. The modification of plans and production procedures in industry was submitted to a change control board which acted as a liaison between production units (the teachers who produce students using the curriculum as a "tool") and management (the administration including the principal, superintendent and central staff, with the board representing the executive, policy-making function). The change control board articulated activities, maintained "on demand" feedback from production units, relayed the information to management, and returned management decision to the production units, while maintaining documentation of all transactions. The computer was used extensively in one aspect of this known as "configuration management" in which products had to meet contractor standards, and production capabilities with complete documentation of changes. The computer supplemented other aspects of the change control board's operations.

The section which follows contains phases which are to be followed within the district or school to accomplish adoption of an innovation. The relationship of the phases to the literature is noted, as the phases are based upon

the needs stated by writers in the field.

The change agent, with the support of the change agency, provides assistance in the district in all phases, starting with awareness (1.0) and concluding with integration of the adopted innovation (6.2) in the district. The diffusion within the district, however, is not the conclusion of the change agent's tasks; he must now assist in the dissemination of the findings of the district and in the outside diffusion of the innovation based upon its value (and effect). (These steps are noted as 6.3 to 6.4.2 on the paradigm.)

The change agent functions with and for the district and probably only so long as he can "prove" his worth to the district. The role of the educational information consultant (the change agent) has been identified particularly well in Rogers' (1962), Far West Laboratory (1970), and Havelock (1969).

The functions of change within the district follow:

1.0 Awareness (realization, felt-need, forced awareness)

Innovations must start where people are at--psychologically. Methods by which this may be determined include a questionnaire or other survey instrument which might be open ended;

establish school teams which would assess attitudes and pursue alternatives suggested by the faculty, staff, students; or hold open forums for open exchange of concerns.

Journals and other professional and mass media will continue to be significant sources of increasing awareness.

The principal will also continue to provide a meaningful awareness of what is being done in other places, or what could be done "here" through faculty meetings and other contacts with faculty who are opinion leaders.

1.1 Develop awareness of need for change. Developing the awareness is accomplished by internal assessment or evaluation, a change agent, or forcing functions. These conditions may be caused by students, faculty, administrators, community leaders, parents, and the school board; or the legislatures (national and state), court decisions, foundations; or crises (natural phenomena), events (international relations, domestic conditions), and the mass media. (This list is suggestive, not inclusive.)

Havelock (1969) recommends the preparation of a D & U (dissemination and utilization) journal. The government could print and distribute a specific journal of this type. Innovative programs could be featured with enough information about the district's characteristics that readers could identify their own conditions with the innovations in a problem-solver capacity.

2.0 Knowledge Gathering

The awareness phase, as defined by Rogers (1962) is followed by interest. At this point the user looks for additional information upon which he can make an evaluation of an innovative idea before deciding to give it a trial.

2.1 Review knowledge base relevant to needs. This includes awareness of and definition of alternatives based on forecasts, projections, trends, programs in other schools, and a computer search by the Educational Improvement Agency, Innovation Center. As Cheydleur comments, in searching the literature for a range of documents tied to a subject, the heuristic program tied to outputs is quite valuable.

2.2 Determine existing policies, legislation, and other regulations which might affect or inhibit change. If restrictions are found which will prevent or delimit the innovation, prepare a case to change the restrictions, using the legal support services which the school is entitled to use. Full lobbying pressure and related political strategies may need to be effected--such conditions must, though, be determined. Areas in which attention may need to be paid include legislatures, courts, accreditation agencies, and school boards.

3.0 Studying of inputs from the Knowledge Gathering:

This component of the paradigm closely approximates Rogers' evaluation. In this paradigm, however, his category is represented by this one (3.0), by Strategies, Approaches, and Techniques (4.0), and by the Adoption Decision (5.0). The breakdown into three areas of emphasis seemed more typical of actual processes.

3.1 Consideration of the relationship of a proposed project/program/function to the existing one. The complexity of the innovations and the changes

in behavior and/or attitudes of the innovator are crucial in planning strategies. They must be carefully evaluated at this time. Also, the innovation may be a substitution of or replacement for an existing program, it may be an addition to an existing program, it may be an alteration of or variation on an existing program, it may require the restructuring of a program or perhaps even of facilities, and it may be necessary to incorporate "value" changes of the school participants. The latter is far more difficult than the previous ones. Finally, a program may be <u>eliminated</u> entirely, the effects of which are potentially more devastating than any of the other alternatives. In all cases a thorough system analysis must be performed at this planning stage.

Although most of the emphasis in educational change is tacitly assumed to mean curricular, this paradigm is intended to facilitate any kind of change: organizational, administrative, functional, or curricular. The objective is improved educational practices, regardless of <u>what</u> they may be.

3.2 The use of Matrix Management techniques should be considered as a means of assessing needs. By overlaying goals with status the identification of needs is enhanced. Further, this technique may be used to consider the impact of a decision on various components of the school system, and the larger community.

Other management techniques which might prove of value at this point include networking projections (such as PERT or CPM) for the change control function, and the use of the Lattice technique for maintaining complex interrelationships in their proper perspectives.

3.3 Other factors to consider are (1) personnel resources, the need to hire, reassign, retrain, or release personnel, and (2) facilities, both current and needed, for the program.

3.3.1 All of the above imply awareness and consideration of budget, policies and laws, "defenders" of the status quo, and innumerable barriers and inhibitors of change as identified by Havelock, Rogers, and others in the survey of the literature. Effective change is accomplished by accurate identification

of these constraints and carefully identified strategies to facilitate the change.

4.0 Strategies, Approaches, Techniques for studying innovations before making a decision to adopt or reject.

4.1 Develop a feasibility study of costs, both initial and operating; benefits and effects; legal aspects; community attitudes and support; accreditation requirements; . . .

4.1.1 Create a simulation of alternatives based on district parameters, conditions noted in 4.1, above. A computer simulation using Bayes methods and/or other probability methods would be most appropriate in this kind of simulation--to optimize gain with limited, but identifiable, input. The "effect" of the innovation under scrutiny as well as its "value" should be evaluated. Often a dramatic effect may be seen in the short run, whereas a valuable, significant change may require either a longer time or a more sensitive instrument to evaluate it. Because the "value" is based on goals, it is subjective; if the goals, however,

are clearly articulated, then value should be easier to obtain.

4.2 Administration should prepare a cost-benefit/effect analysis for the use of participant groups who are defined in 4.5 and 4.6. This is based on long-range and short-range planning, goals and values, and is updated based on feedback from discussion groups (similar to the Delphi technique for forecasting--continual refinement of a position).

4.3 Administration should prepare alternatives for funding ongoing programs and innovations to be presented to groups in 4.5 and 4.6, below. Tax-bases, grants, loans, etc. are to be considered.

4.4 A force-field analysis of change conditions and attitudes should be completed by the administration and a steering committee made up of all participant groups. Opinion leaders should be included, as should persons who have a broad perspective of the change environment.

4.5 Involve community members: parents of students, other adults in community (particularly the "influentials" and "opinion leaders" from <u>all</u>

groups/ factions/ elements . . .

These discussion groups should provide a statement about the needs identified, goals developed, alternatives proposed (including additional ones they may develop), and recommendations on these. The group processes may include discussions, T-groups, C-groups, role-playing, simulations. Havelock (1969) point out that to avoid the problem of "perceived vulnerability" a broad-based community involvement should be developed. The group should determine goals/directions, select prime goals/objectives, inquire into alternatives of meeting goals/objectives, select programs to meet goals/objectives, consider implementation techniques, and define diffusion range. The process of "administering" remains with the administration.

4.6 Involve faculty, staff, professional organizations (including union representatives) in assessment of needs, consideration of alternatives, evaluation of alternatives, and recommendations. (The steps defined in 4.5, above, are equally applicable to this group).

With the professional educators, however, the basis of participation must change from what it traditionally has been to what is an emerging management technique in industry. "Expertise" is the basis for participation, and not "authority" or status in the organization.

The same basic techniques apply to this group as applied to 4.5: discussions, T-groups. force-field analysis, simulations, role-playing.

This model is based upon the findings in the literature that leadership style and administrative characteristics of the superintendent are highly correlated with successful innovation adoption, and that the most effective change is that which is initiated by the users themselves. The structures proposed herein have considered both views and allowed for the maximum "force" of each component in the total process. A closed, or hostile administrative climate will require outside assistance as might be provided by the Educational Information Consultant. The group techniques defined above are likely approaches.

4.7 Develop priorities of change programs using basic "trade-off" techniques of systems approach.

Compare goals, resources, and related significant variables to determine priorities. Matrix techniques, decision tables, and other management science devices may be considered.

4.8 Prepare specific objectives of each innovative program/project and the means of measurement for evaluation and decision-making at 6.1.7, and for progress evaluation along the way.

5.0 Adoption decision point:

Carlson has identified a need for a paradigm/model which includes the decision point to adopt an innovation. Apparently educational decision-making is so lax in some places, that no one is accountable for deciding to adopt, hence no "blame" may be laid if it does not succeed. That it could succeed without leadership is more of a phenomenon.

This decision point is the commitment by the board of education, administration (superintendent), and principals to implement the innovation.

5.0.1 Commitment to the innovation; until this point all deliberations have been evaluative of the innovation, conditions, and personnel which affect the district's total program.

With the decision to adopt an innovation, whether it be a pilot program or a significant full-scale adoption, several steps must be set into operation to ensure the reasonable evaluation of the project. The word success of the project was deliberately avoided. The continuance of an innovation which was nonfunctional or dysfunctional is as bad for morale, budget, etc., as is a totally noninnovative climate. Programs, as well as people, may need to be given the opportunity to "fail" in a situation if the correct circumstances do not exist for continuation.

Hence, the development of a separate function in the district which reports directly to the superintendent and works directly with all components in the district--the change control council, consisting of an ad hoc planning committee and a permanent staff.

This change control council with its permanent staff, and the Educational Improvement Agency represent the heart of the change paradigm. Each of these functions provides information, techniques, strategies, and management

assistance which has been notably missing in educational innovation and change.

6.0 Operational Considerations: School Board, Superintendent, Principals, Central Staff, Change Control Council, Project Staff, Faculty, Staff, and Students.

6.0.1 Change Control Council: a body consisting of two distinct functions, reporting to the superintendent, yet working with all personnel in the change process. The Planning Committee membership consists of administrators, teachers, students, and community representatives. An Educational Information Consultant is also included at this point as a full-time committeeman. Some phases of the planning will be done in the planning conference room at the Educational Improvement Agency using an interactive computer display system.

This committee is an ad hoc committee which will be chosen anew for each innovative program, on the basis of expertise, and roles identified in earlier pre-planning sessions.

The Change Control Operations Board consists of full-time staff personnel (professional and clerical). The Educational Information Consultant is

related to this body on an "on-call" basis, although he will request progress reports for the "phased" operations of the change process. He will provide information and strategies services to the Board. The Educational Improvement Agency provides a "temporary system" linkage during the adoption process (which Rogers, Miles, and Havelock have all identified as outstandingly valuable).

The linkage function ceases for a project when it is integrated with the basic programs or if it is discontinued; linkage for other projects in the district remains an ongoing process, however.

6.0.1.1 The Change Control Operations Board functions:

Provides for <u>renewal</u> of the organization and the personnel in it by continuing processing of proposals, recommendations, insights, etc. by faculty, staff, administration, and students.

It includes a mechanism for handling unanticipated consequences/contingencies, in part by being the linkage between the school district and the Educational Improvement Agency and the Educational Information Consultant.

It develops phased, methodological change processes using networking principles and computer processing of inputs, variables, objectives, and strategies. The same networking principles may also be applied to project management regarding costs, timing, supplies, contract services, and other data.

The Change Control Operations Board also provides management information and planning recommendations to the superintendent and his staff.

The purpose of advance planning using the system approach and of careful scrutiny of the processes by the Operations Board is to reduce the impact of crises, and related, unplanned, outside or inside conditions. The development of alternatives, or contingency planning, is a basic aspect of this operation.

Also, most transactions would not require an interactive, real-time, or time-sharing, computer with high speed terminals or CRTs. This service would be available to Operations Boards, but would not likely be utilized by smaller districts. The findings that administrators do not like to use keyboard instruments, ruled out the hope of

including them as direct participants in the interactive operation, though training of future administrators in computer terminal operation would be of some benefit in this regard. Districts without a Change Control Council (Committee or Operations Board) would utilize a similar, but not as rapid and personal a service from the Educational Information Consultant through the Educational Improvement Agency.

6.1 Adoption Strategies: Project/Program/Pilot Operations. The strategies include adoption of program techniques, personnel incentives and approaches, and reporting and decision-making requirements.

6.1.1 Develop and Analyze Methods-Means selection strategies. Prepare time phases of the project using networking principles. Consider alternative strategies which are most applicable to district conditions; innovation type, level, complexity, divisibility: Develop alternative consequences and their comparative impact on critical functions.

6.1.1.1 Identify formal and informal networks and roles. Include "gatekeepers," "opinion leaders," and all identifiable "networks" of communication and

influence. The inclusion of "defenders" at this point will provide an added perspective for the innovators and may facilitate the defender becoming an advocate. (There is no substitute for having a zealous person "on your side" unless your approach changes and the zealout feels sold out.)

6.1.1.2 Involvement of Faculty, Staff, and Students from the Project School in preparation for awareness of project requirements ("sensitizing"). Describe Project, phases, inputs, outcomes, efforts, etc.

6.1.2 Project Staff Rewards/Incentives, include
Release time and/or
Additional pay and/or
Satisfaction of working with project (altruism).
If in-service education is needed to either upgrade or retrain personnel, the tuition might be paid by the district as an added incentive.

6.1.3 In-service educational programs to train project staff may be operated as in-district programs, or may bring in "consultants" to operate special training. Both university and education-oriented business consultants fill this role.

6.1.3.1 Role-playing, T-groups, and other small group techniques are used to enhance attitude formation toward the innovation, the change process, and the colleagues in the project.

6.1.4 Development of material or methods for application in the educational setting (if not developed at this point). Possible development sources are: Pilot/Project program in the district (funded), Pilot/Project program in a regional laboratory, Pilot/Project program in a university R & D center, Pilot/Project program by a private concern, or Pilot/Project program by another school district.

6.1.5 N.I.H. (Not Invented Here) factor:
The N.I.H. factor may be affected by (1) participation in change planning and operations, and (2) adaptation during adoption, which is typical anyway.

6.1.6 Project reports to provide local <u>dissemination</u> of program. Reports go to (1) all school personnel, parents, adjacent community members, and local media at the project school; (2) to school district personnel; (3) all community, via radio, television and news. Also, project leaders and participants

may meet with project school faculty (both formally and informally), with school district teachers and other administrators, with district office administrators. The need to overcome the low interdependence in schools necessitates such an extensive informal and formal network of dissemination.

6.1.7 Project/Program EVALUATION and DECISION POINT. From the evaluation of the "value and effect" and other formative and summative data, a decision will be made to: (1) adopt (continuation), (2) modify, (3) discontinue, or (4) reject the program. Adoption implies integration of the project/pilot into the regular program at one school if not district-wide.

If the decision is to reject or discontinue at this time, the project ceases, and the results and documentation are provided to the Educational Improvement Agency for inclusion in the data file to be analyzed both for strategy failure and content failure. If the decision is to modify or continue by adoption, the next step(s) are followed.

6.2 Adoption, Integration (with or without modification). Programs for modification return to the planning phase for reanalysis and reprogramming through the necessary project steps as modified.

6.2.1 Integration of the new project/program into the total system (whatever scope that entails) will create a period known as the "stable state." With continual assessment of operations to refine the program as well as all programs, the institutionalization of change will have occurred which is, in essence, self-renewal.

6.2.1.1 Refinement of a program will require rephasing although the steps may be mental exercises as much as they are step-by-step processes. A self-renewing staff requires less adjustment-taking as they tend to review processes and outputs on a regular basis and to "fine-tune" the program on the basis of evaluative data along the way.

6.2.2 Institutionalized Change Processes are Self-Renewal.

6.2.2.1 Planning for renewal becomes an automatic act. The Change Control Council in conjunction with the faculty, staff, administration, students, and

community become oriented to adjusting and correcting programs as needs are determined, as they are sensitive to that determination.

Planning for renewal is built in to the education structure with the multitude of "vacation"times which might be used for retreats.

6.3 Dissemination of project operation, including the content of the innovation and the strategies used to implement. Which of these, and the extent of each, will be determined by the audience to receive the communication.

6.3.1 Outside dissemination might include: the ERIC system, journals, monographs, mass media, demonstration programs, lectures, professional associations. Inside dissemination might include: house newsletters, faculty meetings, board presentations, interpersonal linkages.

6.3.1.1 Ultimately the dissemination of the program/project experience (methods, results) will be used to increase awareness of others of innovative approaches, to aid in overcoming low-interdependence in education.

6.4 Diffusion of the innovation occurs (1) within the school, (2) within the district, (3) outside the district. Through the efforts of the linkage agency the school becomes a demonstration school and aids in diffusion of an improved school practice to a larger and larger number of adopters.

6.4.1 Characteristics of adopters and the different needs for going through Rogers' process will affect the adoption rate hence the diffusion rate. The "interaction" (snowball) effect facilitates adoption among opinion leaders and their followers. As the A.E.S. County Agent proved, a credible, trustworthy change agent can have a similar effect.

6.4.2 The diffusion of the innovation is taken over by the change agency on the basis of results from adopter schools. This step then leads the paradigm to "E.0" and on to "1.0" in a continuous recycling.

The System Model of Educational Change

The model on the following page is a simplified flow chart of the paradigmatic descriptions provided on the preceding pages. The model shows component relationships

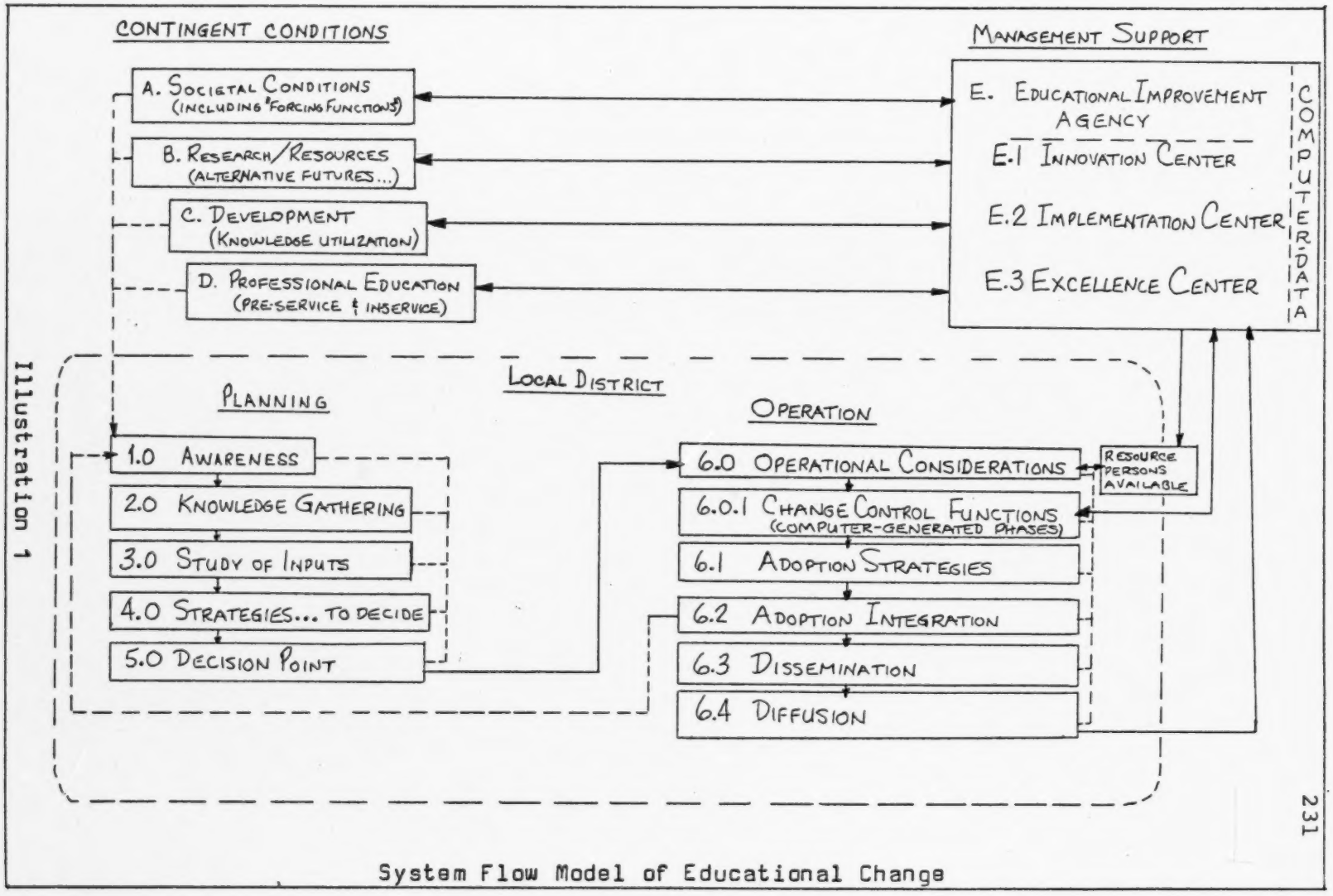


Illustration 1

System Flow Model of Educational Change

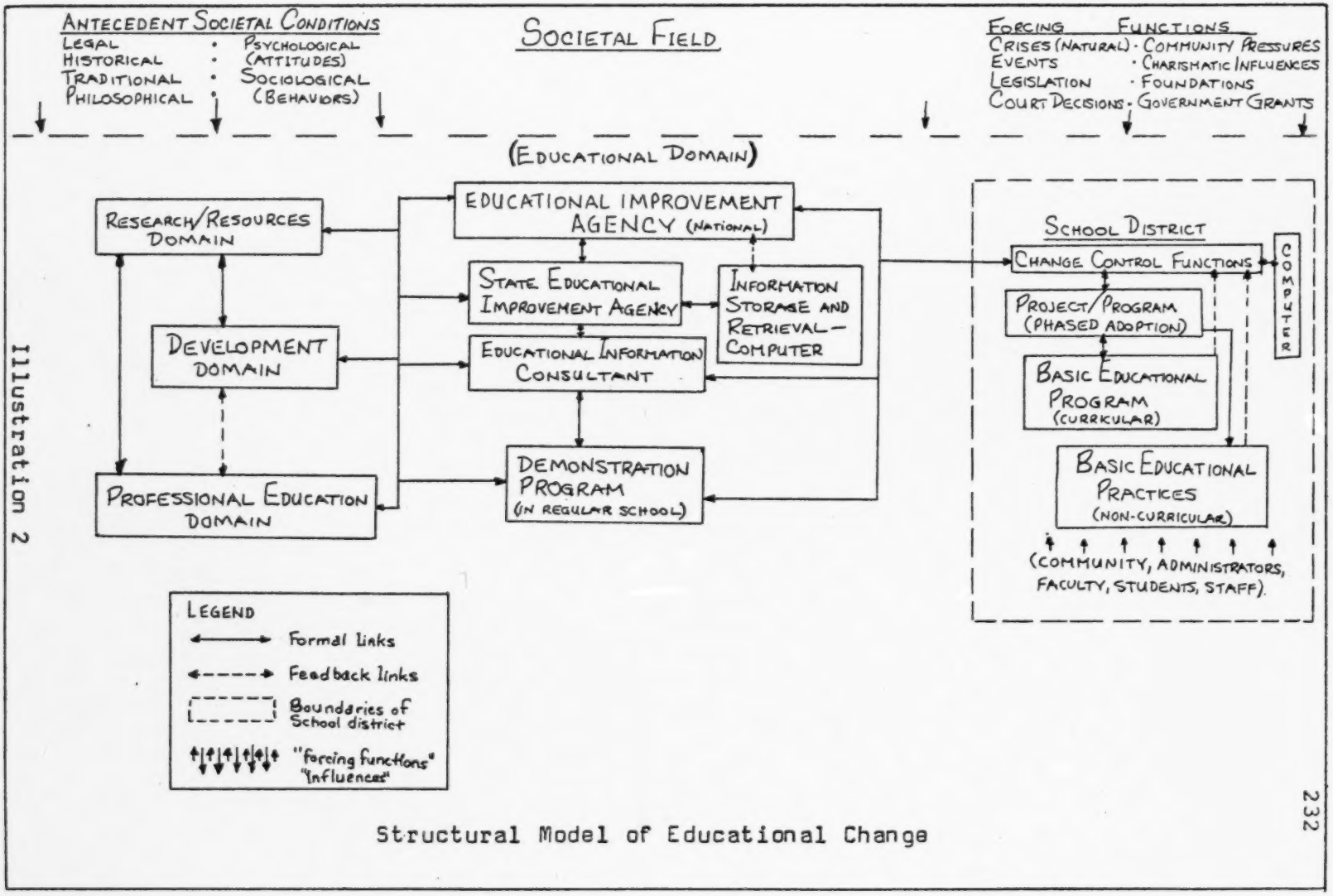
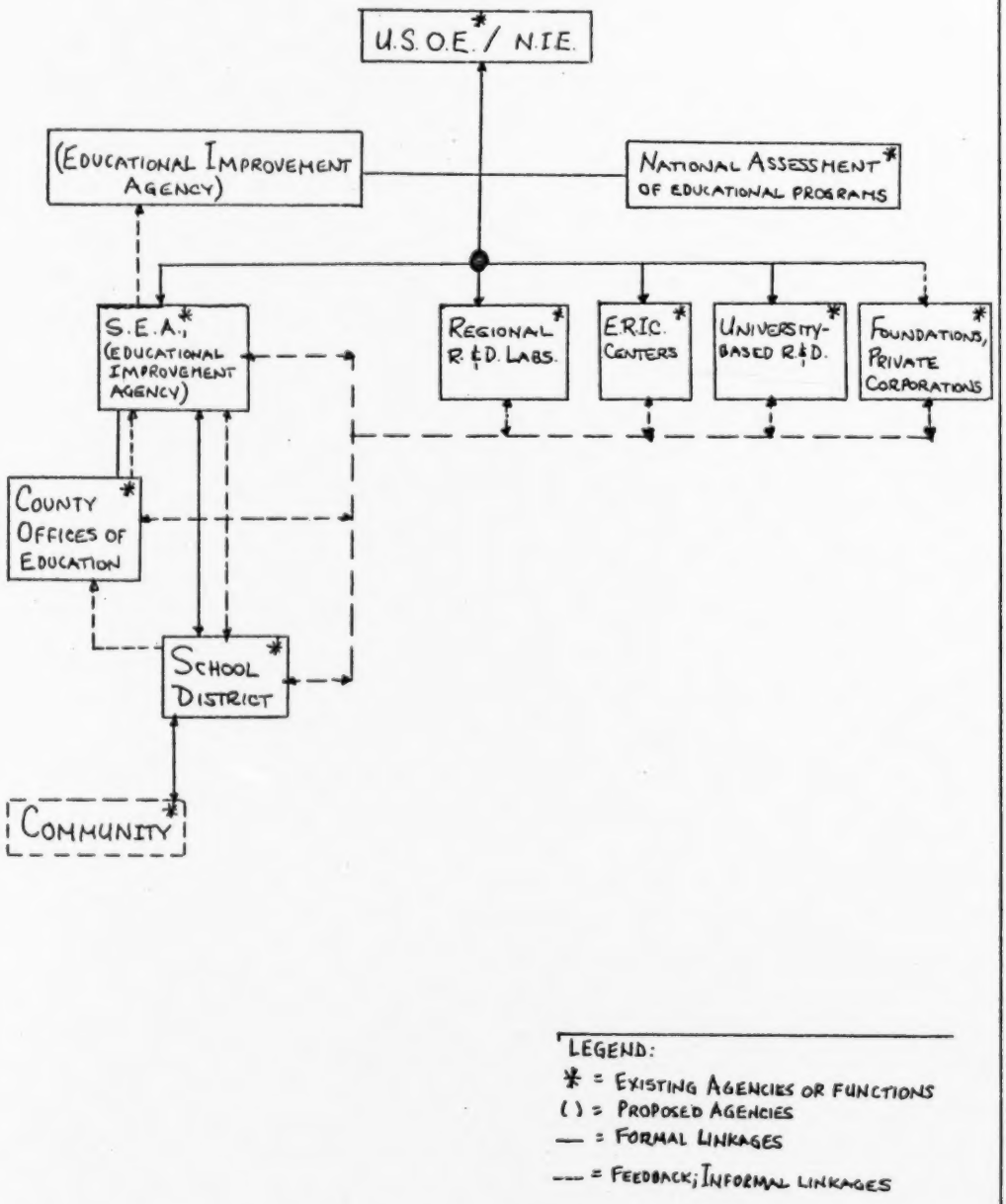
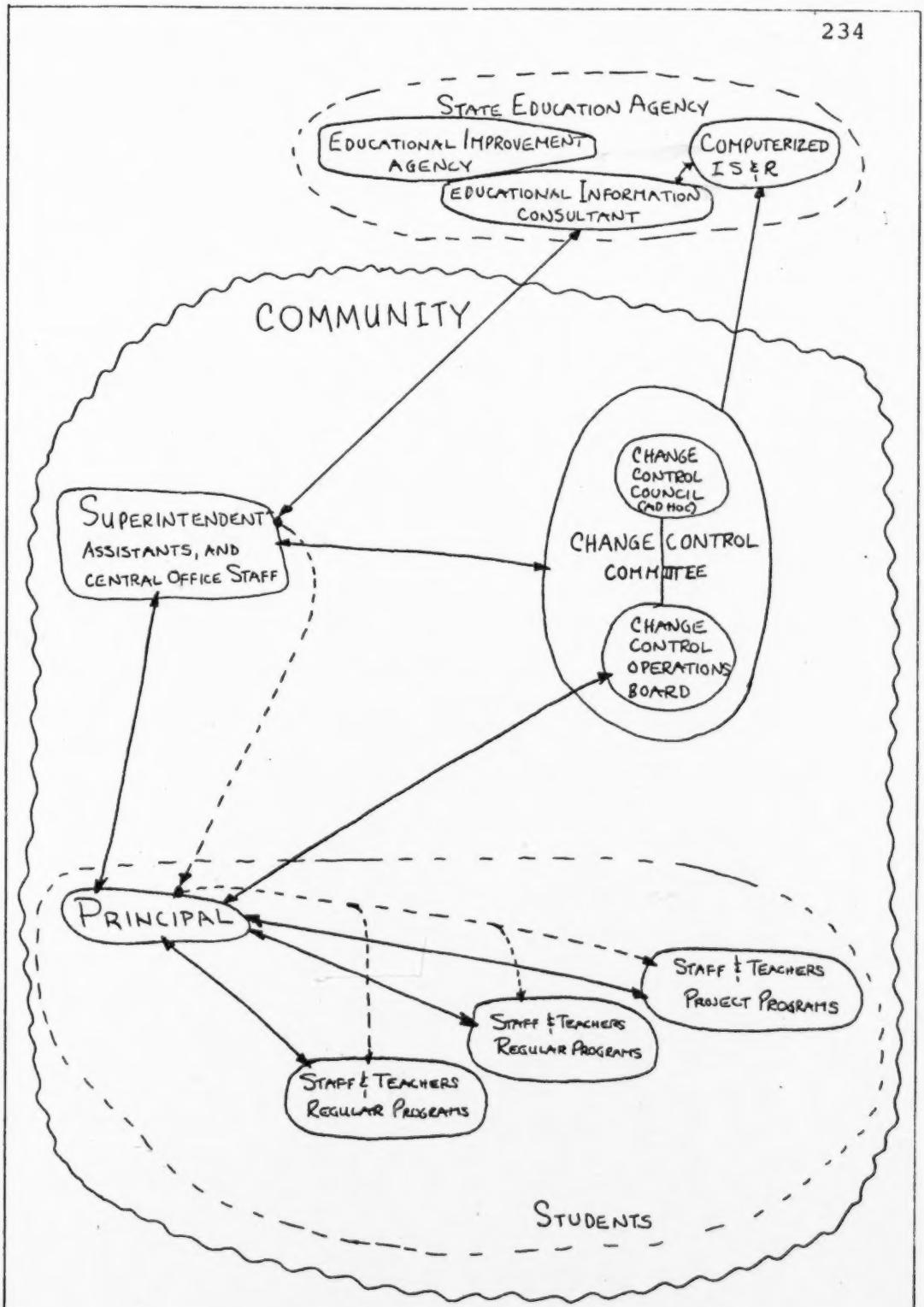


Illustration 2

Structural Model of Educational Change



Projected Relationships
of Key Elements
in Proposed Paradigm
Illustration 3



Projected Local Organizational Elements
Illustration 4

much more clearly, yet the paradigm provides explanation. Additional comments about both will follow the models.

Discussion of the Paradigm

In 1968 the Committee for Economic Development recommended four imperatives for our schools: innovation and change; basic and applied research and the dissemination of the findings; cost-benefit and cost-effectiveness studies and distinguishing among programs of high and low priority; and the establishment of a Commission on Research, Innovation, and Evaluation in Education. The paradigm which is presented meets these needs in the following way: the first imperative is the scope and purpose of this study and the direction which it is going; the second is noted in part B and E (Research and Resources, and Education Improvement Agency, respectively), in addition part 6.3, the local school district includes a basic dissemination effort to precede that of the EIA; the third of their imperatives is met in parts 4.1, 4.1.1, 4.2, 6.0.1.1, and in E; finally, the entire concept of part E is similar to their fourth imperative. Change must be accomplished by a massive effort, on a broad front, as they recommend; we can no longer tolerate the failures which have been noted by

Rogers and Jain (1968), or Nolan Estes (1967), or Bushnell and Rappaport (1971).

The need for a model which accounts for crises was noted by Havelock (1969, p. 11-19); the inclusion of crisis events may be seen in part A and in the Structural Model of Educational Change (Illustration 2).

The need for long-range planning has been identified by Jesser (1969) as a condition educators know nothing about, while Toffler (1970) observes that long-range planning must be based upon a knowledge of alternative futures. Each of these components is on the paradigm at points 4.2 and B.2, respectively. Having choices, and having made a choice, Miller (1970) sees that education must develop mechanisms which facilitate the systematic planning of and management of change. This feature of the paradigm may be observed at points 6.0, 4.0, and E, mainly.

The requirement for management information systems is iterated by Haga (1967), Havelock (1969), Bundy (1970), Beer (1970), and many others. The bulk of part 6.0 is devoted to the management information system method of managing change, as is part E.

Toffler (1970) describes Cross Impact Matrix Analysis which is found in the paradigm at point E.2.1,

and general matrixing techniques were mentioned at point 3.2.

Alkin and Bruno (1970) find that one of the most valuable aspects of management information systems will come in selecting alternative processes for achieving educational objectives, as is noted at points 2.1, 4.1.1, 6.1.1, and E.

John Evans (1970) decries the lack of a nationwide management information system, with a correspondingly large data base. This purpose is met in point E, but also in E.3 where the National Assessment program is included. At the Educational Testing Service Conference (1970), Novick commented that National Assessment is a gigantic information system.

The "forcing function" of Persselin (1970) is to be observed in A.2, and on Illustration 2. Bennis, Benne, and Chin (1969), Gardner (1963), and Marland (1970) directly or indirectly referred to forcing functions which were affecting education.

The inclusion of the community power structure was specifically delineated by Kimbrough (1970), Toffler (1970), and Michael (1967) as representing a significant force to be considered. The paradigm does contend with

community involvement in points 1.1, 4.5, 6.1.6.

Barriers to change, inhibitors of change, and rejection of change are included in the paradigm at points 4.4, and 6.1.7; they are identified by Havelock (1969); Goodlad (1971), Miles (1967), and Carlson (1964).

Miles (1964) is one major proponent of the "temporary system" concept; it was included in the paradigm section E.2.

In 1969, Robert Chin, who is a significant force in developmental models and modeling, found that virtually all current models were models of change and not of changing! Change models are for theoreticians to analyze, while models of changing are for practitioners. This generic paradigm is submitted as a model of changing, which incorporates systems models, and developmental models for their contributions to structure and process, respectively.

The best prepared innovative ideas cannot survive without adequate preparation of teachers and other professionals (Link, 1971; Buchanan, 1971). All of section D is devoted to professional education.

Green (1970), Kent (1968), Havelock (1969) and Rittenhouse and others (1971, 1969) have argued that it is not for lack of knowledge that we do not progress, it is

for a lack of a dissemination system--a linking agency. Part E of this paper is a nationwide linking agency proposal, whereas part 6.0 discusses an intra-institutional linking agency among the teachers, principals, superintendent, and outside linking agency. Farr (1969) strongly asserted the need for a permanent linking agency.

Miller (1967, 1968, 1970) stated that the patterns of disseminating knowledge are too slow . . . promising innovations are often not widely implemented for years. The coordination, of efforts for dissemination and diffusion must be developed and strategies for implementation prepared. This paradigm is a proposal to approach his challenge.

From the review of the literature, and the statement of the problem the fidelity of the paradigm to the requirements of a generic model should be evident. This brief review has not intended to be exhaustive, only representative of the concerns expressed throughout the paper, and the way in which the paradigm and models meet them.

Summary

The demands on education have been indicated earlier. The capability of educationists to meet those

demands has been lacking, according to extensive research and writing. Many of the authors have referred to the need for a change model/paradigm which would be more comprehensive than those of the past; a model which would be one of "changing" instead of one of "change."

Still other authors refer to man's misoneism: to his fear of change, and to the techniques necessary for accomplishing changes. Changes must be purposive and goal-oriented--that is, they must be meaningful. Values distinguish between change and progress, the latter being toward some desired outcome(s).

Thus, the need for the new paradigm, to assist in the comprehensive planning necessary to set goals, develop strategies, define constraints, manage change, document what has been done, disseminate the outcomes, and work toward diffusion of successful innovations throughout a larger population. The paradigm must take into account variables which have not been considered in previous paradigms--crises, natural events, "forcing-functions," a comprehensive information documentation system and a management control system. And, finally, the paradigm must consider an integration of the previous models and paradigms into one generic, comprehensive, broad-field model. The

paradigm presented in this chapter covers the bases which have been identified in the literature. That it does so effectively will await the test of time, by application and empirical testing in the greatest testing ground in education--the public school.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Summary

The change process is a concept which includes a wide array of fields of knowledge. Diffusion, dissemination, and adoption are major components: so are management theory, decision-making, management science, and management information systems. The field of change is studied by anthropologists, sociologists, psychologists, and management students. It is a truly interdisciplinary field. The focus of a single concept such as change can provide an interesting hub about which all of these fields of study revolves.

The concerns about change, particularly its rate and its direction were iterated by virtually all of the writers in the literature of all the fields. The points of agreement were oriented around the need for meaningful change, the use of techniques to facilitate change

(including computers, system approach, and management information systems), and small group techniques for attitude and behavior change, which incidentally, is to include all participants in a change field. Another area of common concern was with strategies for change. One of the most promising strategies of change has been identified (after a review of 7,000 items in the literature) by Ronald Havelock. He uses the linkage strategy as a representative of the best elements of the Problem-Solver, Social-Interaction, and Research, Development, and Diffusion strategies.

Inclusion of "temporary systems" in a strategy was studied by several researchers and found to be effective in adoption of innovations.

Regardless of the approach taken by the researcher, all seemed to agree upon the need for effective communications to effect dissemination and ultimately adoption and diffusion of innovations.

There is a well defined need for professional education to upgrade its programs, to articulate programs with needs of schools, and to begin preparations for a curriculum to educate "change-agents."

The complexity of the change process in education is so great that it is recommneded that comprehensive sytem analyses and syntheses be carried out by teams rather than by individuals. Even with the best guidelines and system approaches, it is possible to miss significant variables in designing a change strategy which could jeopardize the success of the change as well as leave a "permanent" attitude against any form of change--and there is more of that than education can tolerate, now!

Certain assumptions were made at the outset of this study which should be commented upon at this time.

1. "Public education will continue to be the major organization for schooling youngsters." There is a question about the survivability of the public schools in the literature, but it seems that there is also still hope. That hope lies, though, in the change efforts of educators toward meaningful change.

2. "The fields of sociology, management science, management systems, information systems, and the related studies of diffusion, change, administration, system analysis and synthesis, and information processing contain enough corresponding elements that a generic model/paradigm may be developed." This assumption was correct, there was

no lack of information, although the search to find "corresponding" information was highly involved.

3. "The concepts of force-field analysis and forcing function are somewhat related, and are relevant to the diffusion, adoption, and change process." This assumption was also found to be correct, though the exact relationships were not as I had anticipated, they both were valid concepts to include in this generic model/paradigm.

4. "The change process can be institutionalized in the public education system." Such an assumption requires a longitudinal study for accurate validation. On the basis of the survey of the literature, no statement can be made regarding the accuracy of this assumption.

In addition to the basi assumptions there were three questions to be answered. The outcome, though it was not specifically stated as such in the questions, was stated in the assumptions--a generic model/paradigm will be the end product of this research. This condition was found to be possible.

1. "What components, phases, steps of existing studies on educational change, diffusion, adoption and educational and industrial management can be intersected

with the findings and methods of system analysis, synthesis, and management information handling to provide a generic model of change?" The distinctive components of each of the fields discussed were identified and were, in fact applicable to a matrixing of functions from which a generic model was developed. Question 1 was satisfactorily answered.

2. "What questions exist or can be developed which will provide guidelines to educators planning an educational change? Ultimately how can these questions relate to the paradigm of change?" Both parts of this question were answered. The questions which were identified were used in the definition of the scope and depth of the paradigm of educational change. Thus, question 2 was completed.

3. "What information exists on school district characteristics and requirements that can be extrapolated into the generic model/paradigm of educational change?" Through the review of both the theory of change, and the experiences of those who have changed, a number of items was isolated, placed on cards, and literally arranged like a solitaire deck until all the required components were included. So, this question, too, was satisfactorily resolved.

During the preparation of this model/paradigm certain concerns continually made their presence. Thus, in addition to the questions to be answered at the outset of this dissertation, the following questions were listed. The generic model/paradigm successfully met the demands of every one of the questions which had to do with its scope.

The needs which were identified were:

1. A model for changing.
2. Need for a linker function.
3. Need for inclusion of the adoption decision point.
4. Need for the inclusion of professional education.
5. Involvement of all participants in change.
6. Use of existing knowledge requires development.
7. The level and kind of change is related to adoption and to the strategies necessary for adoption.
8. The inclusion of a time frame.
9. Need to develop a central facility for collection, dissemination, storage, of D & U process(es).
10. Need to include "crisis events" in the model.
11. Both process and structure of change are needed.
12. Need for management coordination and strategies to decide among alternatives.

13. There is a lack of compatibility in data elements (two kinds), NAEP and similar projects will aid in developing a compatible data base.
14. Administrators will not use a keyboard device, in most cases, therefore interactive programs are inhibited at this time.
15. Planning units and operating units are separated, and lack communication which is interactive.
16. System intervention must be possible (crisis situations and change agent controls).
17. Diffusion of innovations must be within a school as well as among schools!

Conclusions

Based upon the review of the literature which included studies and theoretical papers the following conclusions can be made:

1. Education can change using the ideas of planned change.

2. Ideas, concepts, practices, and materials can be diffused through the educational establishment much more rapidly than the fifty-year rate found by Mort.

3. Change strategies are viable procedures to enhance successful innovation, dissemination, and diffusion.

4. The system approach methodology is of particular benefit in planning change for its holistic approach which reduces the chance of spurious conditions creating a condition of rejection.

5. The system approach to the study of change and of model/paradigm development seems to be viable, and with the necessary methodological rigor to qualify it as an "accepted" metholodogy in the behavioral sciences.

6. Management Information Systems which have existed almost exclusively in business and industry do appear to have outstanding promise for application in education. This is particularly the case when large districts utilize them or consortia of smaller districts share a facility. The capabilities of strategic planning, highly accurate decision-making, and sophisticated synthesis techniques make the MIS approach specifically appropriate now that educators are "accountable" and must use "PPBS."

7. The institutionalization of change seems to show some promise of being a reality with the utilization of an adequate linking agency and the other mechanisms and strategies to maintain a linking relationship.

8. The development of existing research and resources is more critical than the production of new knowledge. Our priorities must reflect this condition, although such a change will be difficult to accomplish considering the vested interest of research institutions.

9. Any change should involve as many of the participants in the change as is possible. At the very least representatives from groups affected by a proposed change should be included in planning.

Implications

As with the conclusions, there are so many possibilities that only the most significant can be included. The following represent my view of significant implications:

1. The federal government, possibly through the National Institute of Education, could install a computerized information handling system as was described in this paper. Havelock, in particular, believes very strongly that the federal government must support and be involved in educational change and diffusion processes; Guba upholds his comment. It would be a natural repository for these reasons:

a) access to university research from grants submitted through HEW agencies and other federal agencies.

b) access to National Assessment data.

c) funds to operate a comprehensive computerized data base.

d) funds to provide innovation grants on proposals for which no previous programs are available for the data bank, and/or for a "forcing function" for schools which are notably "retarded."

e) it is a permanent system (Havelock 7-32) offering security, identity, coordination . . .

f) through the State Education Agencies it can provide "local" assistance and "demonstration programs" as well as coordinate with the state agency.

g) previous federal change programs (ESEA, Title III) have not had the impact expected; perhaps this system approach, linking model (in conjunction with the work of Operation PEP, PMIS, COPED, and others will pave the way for an exciting era of educational innovation, change, and diffusion.

2. The system approach presented in this paradigm, coupled with powerful MIS, computer-based programs may have the necessary influence on Professional Education

programs to move them into the present and ultimately the future.

3. Closely related to this is that the same power will create a climate in which Development activities will keep pace with educational needs. In the case of commercial ventures, this will mean providing "validated" software, materials, media, books, etc.

4. The gap between theory and practice may be narrowed with a systematic effort to utilize the demonstration programs to their fullest.

5. The approaches of PPBS, "vouchers," and "accountability" may influence education (a forcing function) so severely that the "domesticated" educational institutions may have to accelerate their rate and direction of change (implying purposiveness).

6. The development of integrative frameworks of educational change may provide the impetus for re-establishment of faith in the schools with the corresponding financial support which will allow for change, and will create greater faith . . .

7. And, as was mentioned in one of Goodlad's quotations, schools as we know them may not exist in a few decades (or less?). "Alternative forms" within the regular

education structure is not the same as "alternative choices" such as the experimental schools. The purpose of this paradigm is to allow the public schools to offer the kind of diversity within the school setting that can be gotten outside the school setting. Only by this diversity will the schools remain intact.

Recommendations

There are so many possible recommendations which could be generated from this study that it will be necessary to filter them to some interesting possibilities.

1. The data base, programs, linkages, legal structures, etc., need to be developed to install the proposed paradigm of educational change.

2. Based to some extent upon the preceding comment, the paradigm needs to be utilized for empirical designs to test its validity, strengths, and weaknesses.

3. The value of alternative futures in selecting long-range programs needs to be studied to assess the predictive validity of alternative futures, the value of the scope of studies presented, and the influence upon long-range planning. In a longitudinal study the outcomes of long-range planning based upon projected futures could

be evaluated.

4. Alternative methods of disseminating information to potential adopters needs to be tested, empirically. The ERIC system has not had the effect it was supposed to have; many classroom teachers and even school librarians do not know about it.

5. Studies on the effect of the information push-pull concept (Baran, 1968) need to be developed to determine if the overload of push does inhibit utilization, and if the "on-demand" nature of pull does not cause a "starve-out" of information. ERIC is a pull system and it does not get the use it should or could.

6. Specific studies of forcing functions as an influence need to be added to the sparse body of knowledge of adoption, change, and diffusion under force.

7. The accuracy of force-field analysis in identifying forces of resistance or facilitation of change needs to be studied.

8. The strongest possible combination of decision-making inputs between man and machine needs to be studied (probably in a Matrix format) to relate to the complexity of the innovation.

9. The application of Bayesian statistics, heuristic programming, and related management science methods needs to be analyzed for their value in education.

10. The effect of district-run compared to consultant-run in-service training programs for teachers, administrators, and even staff, needs to be evaluated.

11. The amount of change in behavior and attitudes (longitudinal) as a result of small group participation compared to different techniques needs to be determined. (Relate to adopters.)

12. Discontinuance, rejection, alteration, modification, should be studied to distinguish between "stated" reasons and "real reasons." Discontinuance is not inherently a disadvantage--it may provide a safety feature or prevent "future shock."

" . . . intelligence does have its uses; the theory
and practice of educational innovations
may well turn out to be
one of them."

(Miles, 1964)

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